

EMFAC2011-SG

User's Guide



California Environmental Protection Agency

 **Air Resources Board**

December 3, 2012

EMFAC2011-SG

1.0 INTRODUCTION

EMFAC2011-SG is a new simplified tool that provides air quality planners, transportation planners, and other EMFAC users a tool for assessing emissions under different future growth scenarios. This includes conformity analyses of transportation plans and programs with the State Implementation Plans required by federal law, State Implementation Plan inventories, alternative growth scenarios associated with regional transportation planning for greenhouse gas reductions (SB375), and the like.

EMFAC-SG takes the output from EMFAC-LDV and EMFAC-HD and applies scaling factors to estimate emissions consistent with user-defined vehicle miles of travel (VMT) and speeds. The EMFAC-SG module also estimates the benefits of Pavley-I and LCFS.

EMFAC2011-SG is developed in Microsoft® Access platform, and replaces the functionalities of the WIS module in EMFAC for transportation conformity purposes. EMFAC2011-SG is an external module that uses the inventory from EMFAC2011-LDV and EMFAC2011-HD modules and scales the emissions based on changes in total VMT, VMT distribution by vehicle class, and speed distribution. EMFAC2011-SG processes data only at a sub-area level. Therefore, in order to process regional scenarios (State, Air Basin, Air District, MPO, County), the model needs to process all sub-Areas in its domain and aggregate the results. Therefore, for a single “Statewide” regional modeling scenario, the model will need to run and aggregate the results of all 69 sub-areas (GAIs). Regional-level outputs are aggregated as part of model output. Therefore, the model will produce individual outputs for each GAI, but also produce the aggregated region-level output (Statewide output). EMFAC2011-SG uses the VMT-weighted speed distribution at the daily level, and allows users to generate MPO-level outputs, in addition to the Statewide, Air Basin, Air District, County, and Sub-Area level outputs. EMFAC2011-SG inputs and outputs are generated in Microsoft Excel format (*.xls).

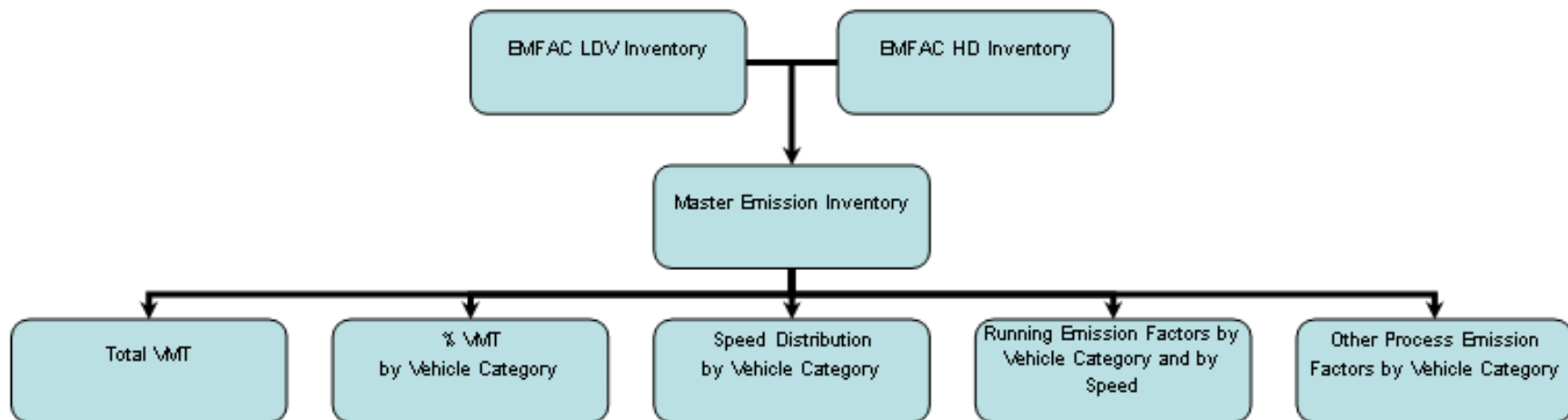
2.0 MODEL OPERATION AND LOGIC

Since transportation plans and policies are created by the local governments, the vehicle usage and speed profiles vary greatly at the sub-area level (GAI or CoABDis). Therefore, the EMFAC-SG module was also developed to process speed data at the sub-area level.

EMFAC-SG uses the combined Burden-level outputs from the two models (EMFAC-LDV and EMFAC-HD) disaggregated by Model-year and Speed (5-MPH increments) as the base inventory. The base inventories are pre-processed by sub-area, calendar year and season, and are available to download along with the SG package. Users are required to download the inventories for the regions of interest to their computers.

Each sub-area modeling case is called a 'Scenario' (defined by sub-area, calendar year, and season). When a user models a scenario, the EMFAC SG model imports the data from the corresponding base inventory file, and disaggregates the data into different parameters as shown in Figure 1.

Figure 1 Schematic of EMFAC-SG Logic



Based on the modeling parameters, SG uses the following equations to calculate the emissions by Vehicle Category (VC):

$$\text{Running Emissions}_{VC} = \text{Total VMT} \times \text{VMT Fraction}_{VC} \times \left[\sum_{\text{Speed}=5}^{70} \text{Speed Fraction}_{\text{Speed},VC} \times \text{Running Emission Factor}_{\text{Speed},VC} \right]$$

$$\text{Other Process Emissions}_{VC} = \text{Total VMT} \times \text{VMT Fraction}_{VC} \times \text{Process Emission Factors}_{VC}$$

Where:

$$\text{VMT Fraction}_{VC} = \frac{\text{VMT}_{VC}}{\text{Total VMT}}$$

$$\text{Speed Fraction (\% VMT}_{\text{Speed}}) = \frac{\text{VMT}_{\text{Speed}, VC}}{\text{Total VMT}_{VC}}$$

$$\text{Running Emission Factor (g/mile)} = \frac{\text{Default Running Emissions}_{\text{Speed}, VC}}{\text{Default VMT}_{\text{Speed}, VC}}$$

$$\text{Process Emission Factor (g/mile)} = \frac{\text{Default Process Emissions}_{VC}}{\text{Default Total VMT}_{VC}}$$

3.0 INPUT DATA ELEMENTS

EMFAC2011-SG has three main inputs, and one optional input:

- Base Inputs
- VMT Distribution by Vehicle Category
- Speed Profiles
- Regional Scenario (optional)

The modeling parameters in all three inputs are defined at the sub-area level. In order to correlate the data in the three input sheets, the model identifies each case as a “Scenario”. In order to process regional scenarios, users are required to classify all the “scenarios” into groups; the model processes each scenario individually and aggregates data by groups at the end of model execution.

User Input #1: Base Inputs

- This is the most important input for the model. It contains scenario definitions that include sub-area, calendar year and season, and selections for VMT profile (model defaults or user defined), VMT by Vehicle Category (model defaults or user defined), and Speed distribution type (model defaults or user defined) for each scenario.
 - If the “VMT profile” entry for the scenario is *User* defined, then the user also needs to enter the “New Total VMT” data (miles/day)
- *Input Variables:*
 - a. Group (Integer) – Identifier for grouping/aggregating the scenarios
 - b. Area (Text) – Denotes the Area/Region name for each group
 - c. Scenario (Integer) – Index representing order of modeling scenario
 - d. Sub-Area (Text)
 - Options: Selected from a list of 69 sub-areas (CoABDis or GAI)
 - e. CalYr (Calendar year)
 - Options: Any calendar year between 1990 and 2035

- f. Season (Text)
 - Options: “Annual”, “Summer”, or “Winter”
- g. Title (Text)
- h. VMT Profile (Text)
 - Options: “Default” (model default) or “User”(user-defined)
- i. VMT by Vehicle Category (Text)
 - Options: “Default” (model default) or “User”(user-defined)
- j. Speed Profile (Text)
 - Options: “Default” (model default) or “User”(user-defined)
- k. New Total VMT (Numeric) – Represents user-defined total daily VMT (miles/day)
 - If the scenario VMT Profile is designated as “Default”, then the “New Total VMT” cell can be empty (user entry for “New Total VMT” will be ignored)
 - If the scenario ‘VMT Profile’ and the ‘VMT by Vehicle Category’ are designated as “User” (user-defined), then the “New Total VMT” cell can be empty (the VMT from the “VMT by Vehicle Category” table will be used in the calculations; user entry for “New Total VMT” will be ignored)
 - If the scenario VMT Profile is designated as “User” (user-defined), and the ‘VMT by Vehicle Category’ is designated as “Default” (model default), only then the “New Total VMT” cell needs to be populated (here, the Default VMT fractions by Vehicle Class are used to apportion the User provided “New Total VMT”)

User Input #2: VMT by Vehicle Category

- Contains daily VMT data by Vehicle Category, and is a required input if the “VMT by Vehicle Category” entry for the scenario is *User* defined,
 - Data entered in the “VMT_by_VehCat” worksheet (in miles/day)
- *Input Variables:*
 - a. Group
 - b. Area
 - c. Scenario
 - d. Sub-Area

- e. CalYr
- f. Season
- g. Title
- h. Veh & Tech: EMFAC2011 Vehicle Category
- i. New VMT: Daily VMT by Vehicle Category

User Input #3: Speed Profile

- Contains the speed distribution by vehicle category (represented by % VMT in each speed bin for an average day), and is a required input if the “Speed Profile” entry for the scenario is *User* defined
 - Data entered in the “Speed_Profile” worksheet
- *Input Variables:*
 - a. Group
 - b. Area
 - c. Scenario
 - d. Sub-Area
 - e. CalYr
 - f. Season
 - g. Title
 - h. Veh & Tech: EMFAC2011 Vehicle Category
 - i. EMFAC2007 Veh & Tech: EMFAC2007 Vehicle Category
 - j-w. 5MPH-70MPH: Speed Distribution (% VMT at each speed bin) for Speeds 5 - 70 MPH @ 5 MPH increments

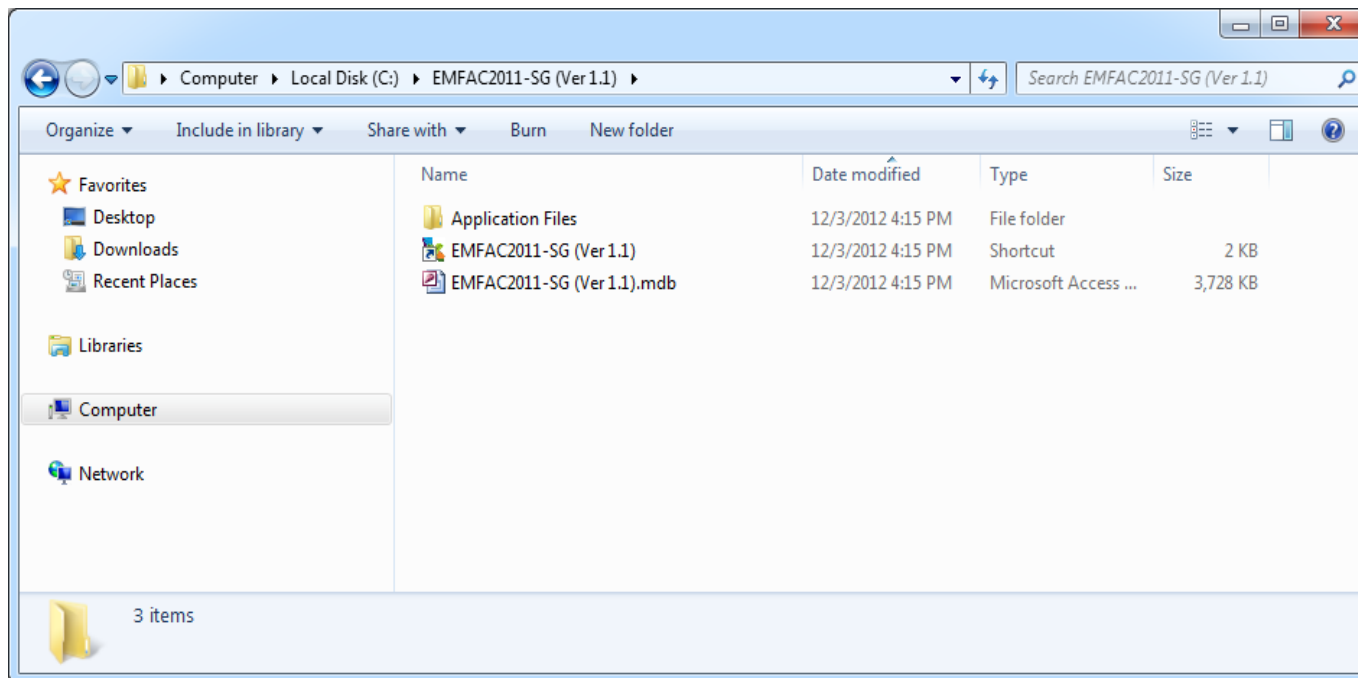
Optional User Input: Regional Scenarios

- This is an optional input for modeling
 - Allows users to create Regional (multi-GAI) scenarios outside the model, and import them into the model
- *Input Variables:*
 - a. Group
 - b. Group Type

- c. Area
- d. Calendar Year
- e. Season
- *Regional Scenario Groups*
 - All scenarios that need to be aggregated together should be classified in the same “Group” in the Scenario_Base_Inputs table
 - So if the user needs to run “Statewide 2008 Annual” and “Statewide 2010 Annual”, then user should create two “Groups”
 - All scenarios related to Statewide Sub-Areas that relate to 2008 Annual period in the first group
 - All scenarios related to Statewide Sub-Areas that relate to 2010 Annual period in the second group
 - All input tables (Scenario_Base_Inputs, Scenario_VMT_by_VehCat, and Scenario_Speed_Profiles) need to identify the Group, Area name, Scenario, Sub-Area, CalYr, Season, and Title for each Scenario
 - If users only need Sub-Area (GAI) runs, then
 - All scenarios should be grouped in the ‘Default’ Group # (1)
 - Area name category should be “-“ [Area name “-“ denotes that it is not part of any “regional” run, and these results will not be aggregated by Group (results will still be generated)]
 - For any scenarios where Area name <> “-“, outputs will be aggregated based on Group ID
 - Model allows Regional Scenario table to be imported using the “Load/Run Regional Scenarios (External Files)” option

4.0 MODEL EXTRACTION

1. Extract the “EMFAC2011-SG (Ver 1.1).zip” file to the **root C drive (“C:\”)**
2. The process will create a folder on the root C Drive called “EMFAC2011-SG (Ver 1.1)” and will contain the following files:
 - “EMFAC2011-SG (Ver 1.1).mdb” file
 - “EMFAC2011-SG (Ver 1.1)” Shortcut file
 - <Application Files> folder containing:
 - 1 Microsoft® Access file (“EMFAC2011-SG Processor (Ver 1.1).mdb”)
 - <Inventory Files> folder containing 9,522 Microsoft® Excel (EMFAC Inventory files)
 - <CTF Ratios> folder containing 69 Microsoft® Excel (EMFAC CTF Ratios files)



5.0 SYSTEM REQUIREMENTS

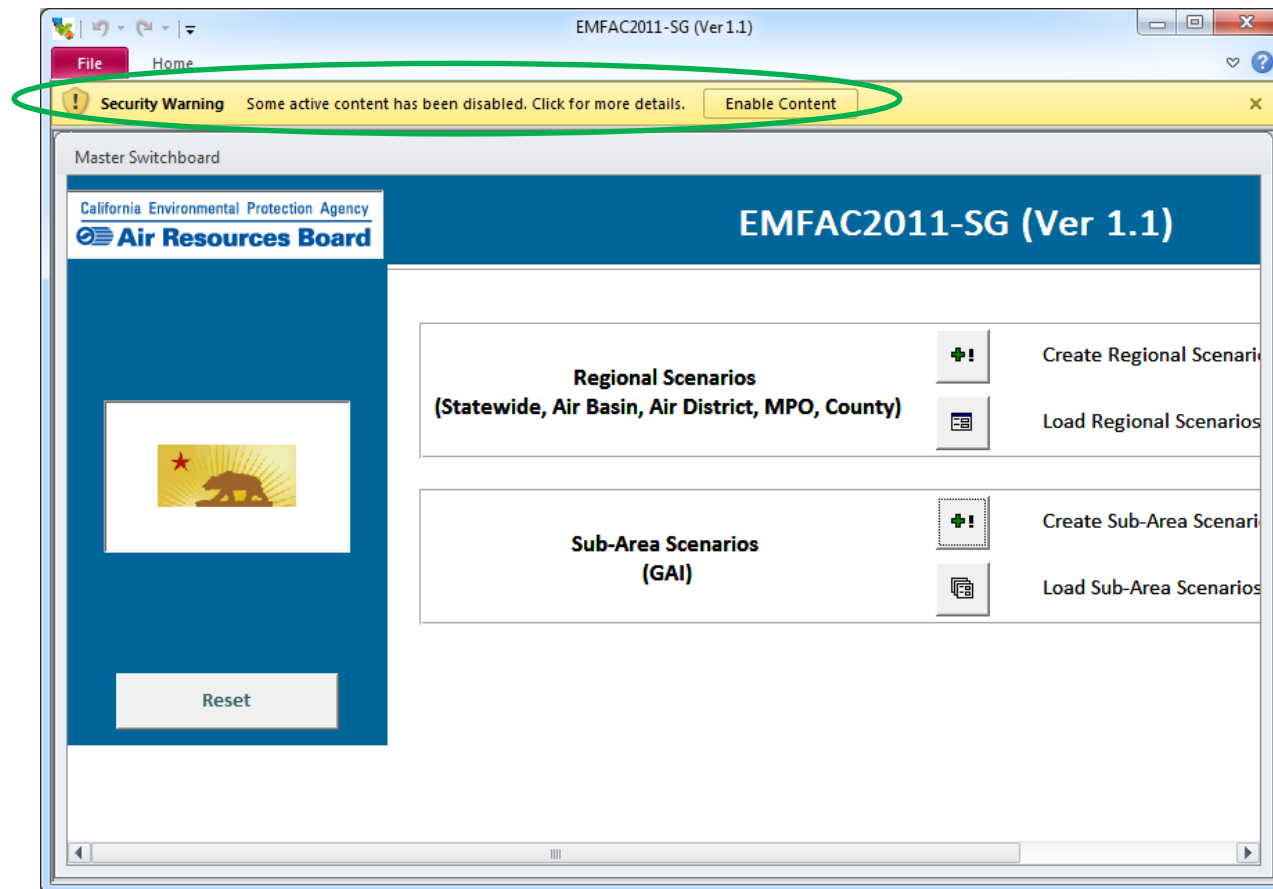
The SG module requires Microsoft XP or a more recent operating system; and Microsoft Access and Excel 2003 or newer to run the module.

6.0 MODEL INSTALLATION (FIRST TIME USER)

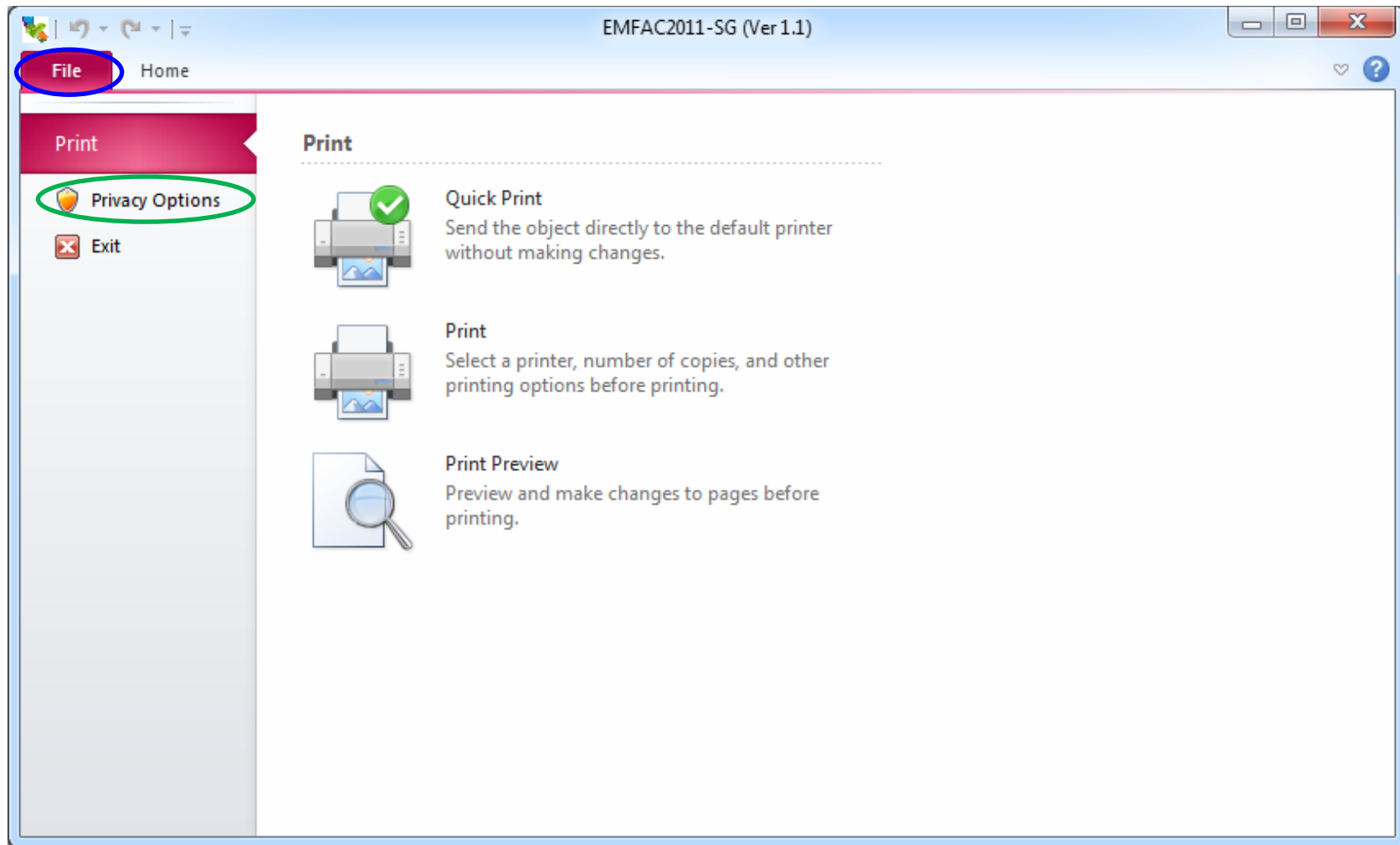
EMFAC2011-SG is created in Microsoft® Access (MS Access) and contains Visual Basic for Applications (VBA) code for processing the data. Therefore, first time users may get a “Security Warning” depending on their system’s “*Security Settings*”. If such an error message is received, follow the steps described below to enable the modeling processors.

6.1 MICROSOFT® OFFICE 2007/2010 USERS:

1. Open the file <C:\EMFAC2011-SG (Ver 1.1)\EMFAC2011-SG (Ver 1.1).mdb>
2. Microsoft® Office 2007/2010 users may receive a yellow notification ribbon at the top:
“Security Warning – Some active content has been disabled. Click for more details.”

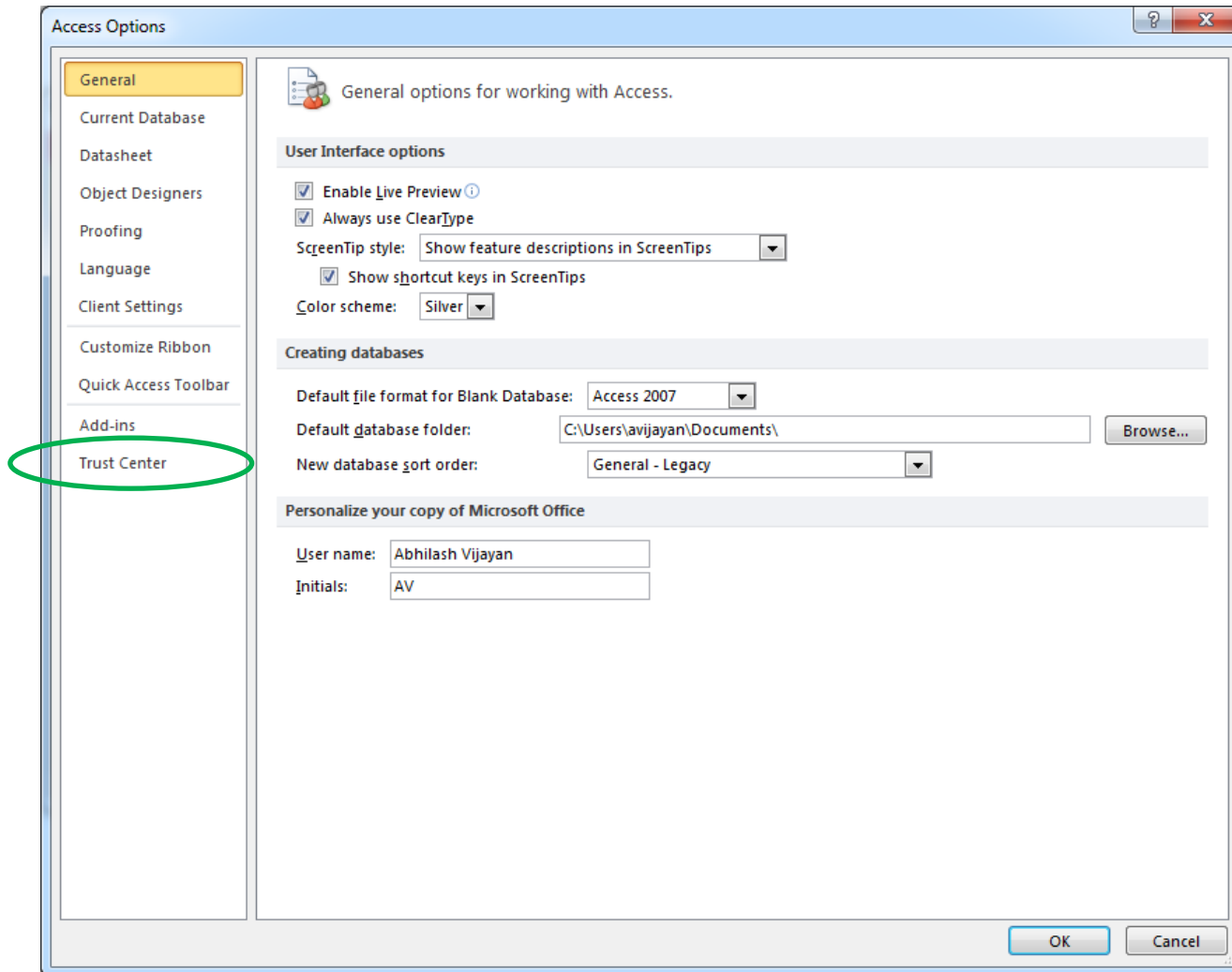


3. Click 'File' to reach Microsoft Access Menu
4. Click 'Privacy Options' to reach Microsoft Access Options

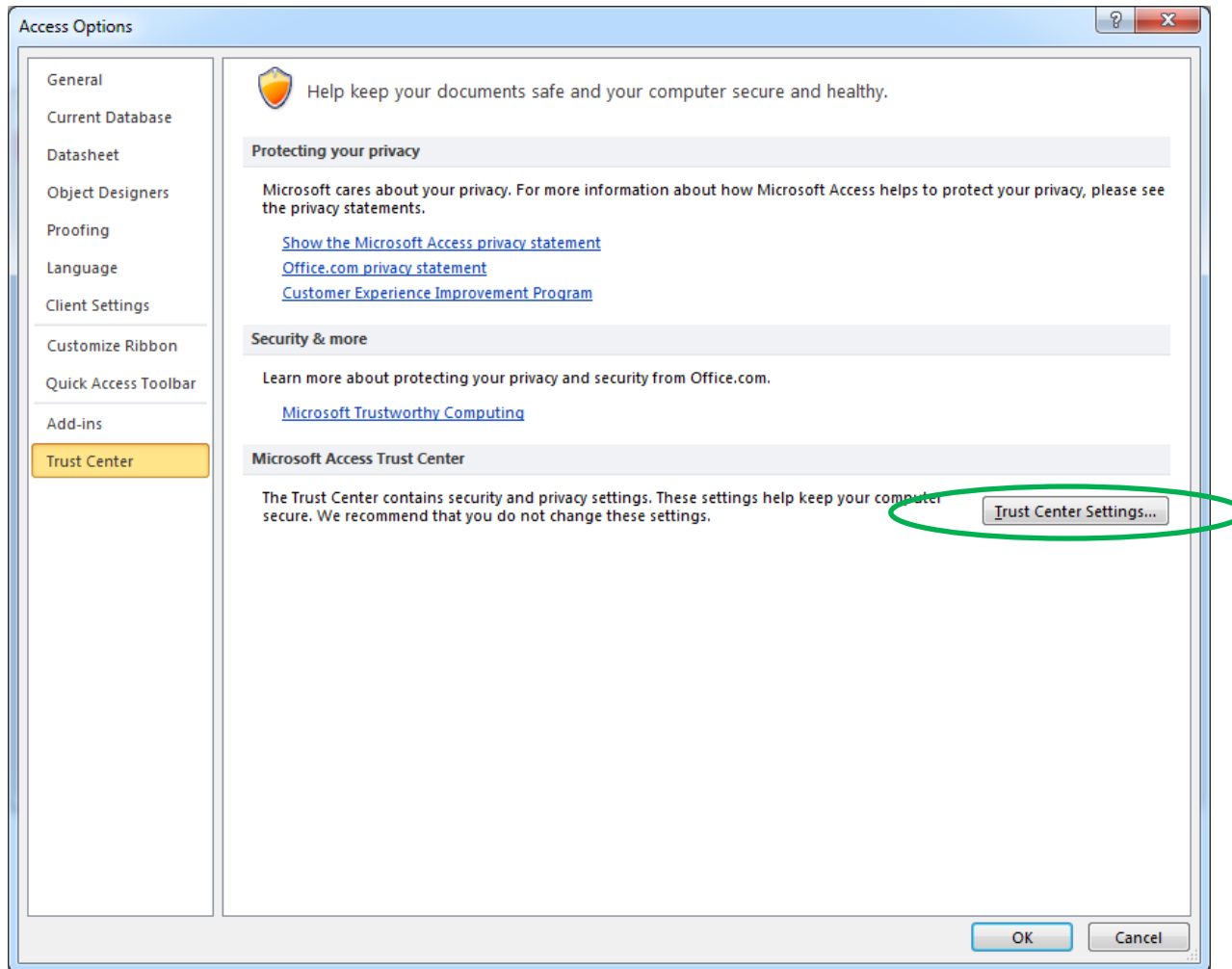


5. Access Options will open up

6. Click on 'Trust Center' button

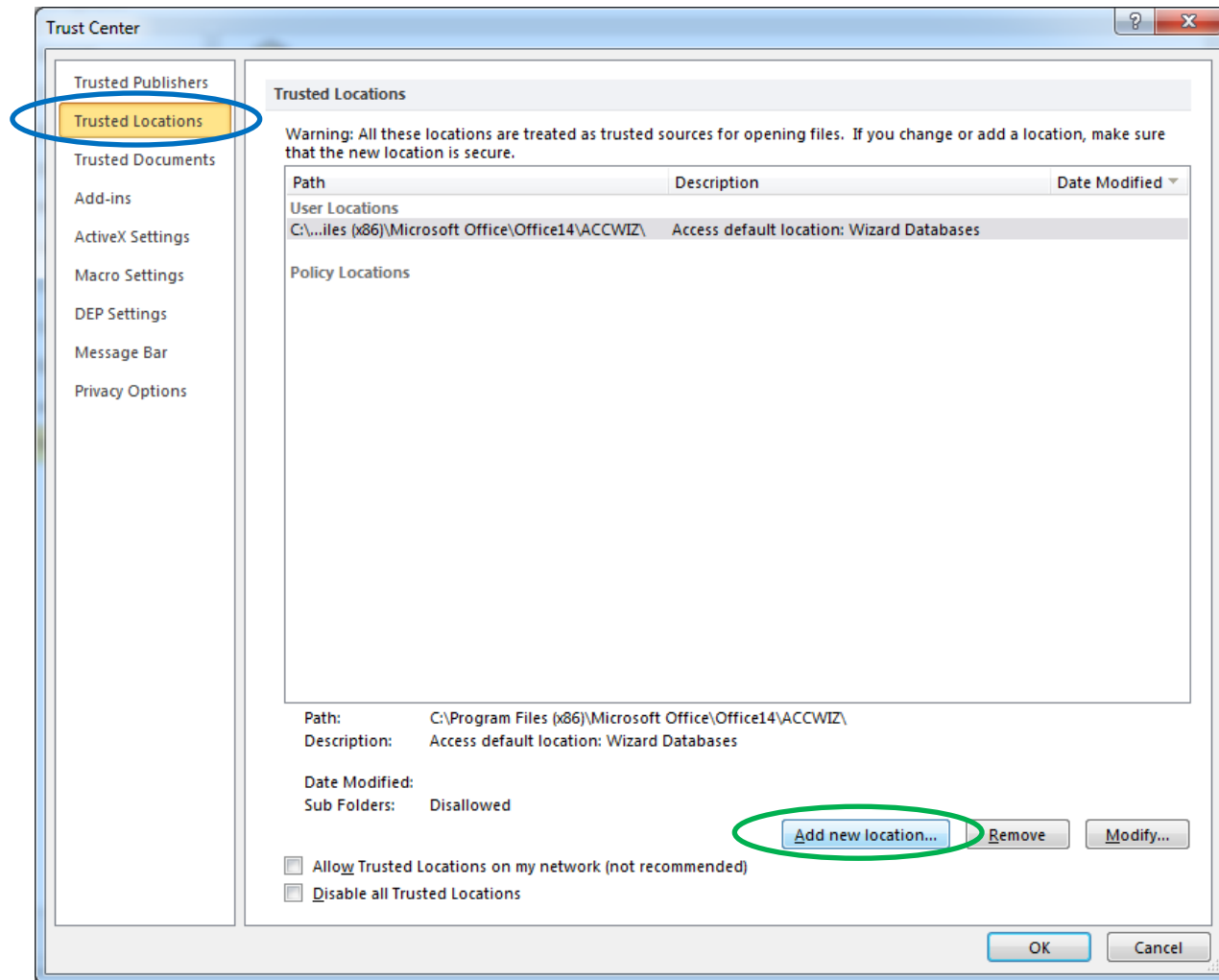


7. Trust Center Options will open up



8. Click on 'Trust Center Settings...' button

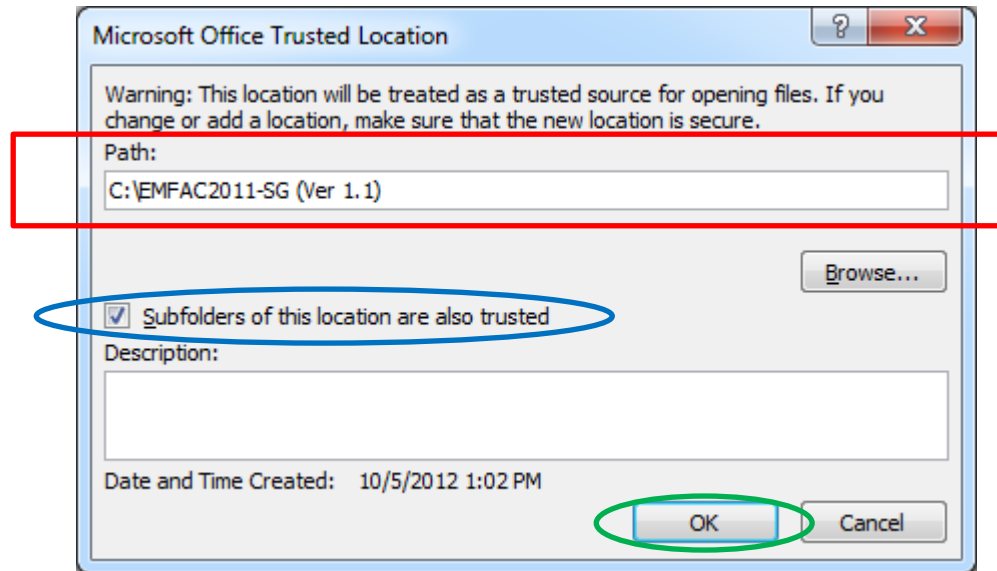
9. Click on 'Trusted Locations' option
10. Click on 'Add new location' button



11. Microsoft Office Trusted Location window will open up

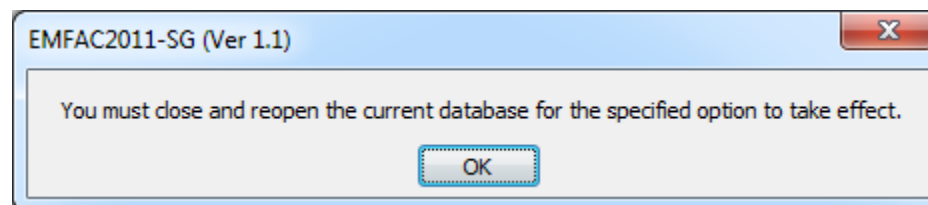
12. Type "C:\EMFAC2011-SG (Ver 1.1)" in the 'Path' field

- Check 'Subfolders of this location are also trusted'
- Click 'OK'



13. Click 'OK' on all previous messages boxes, and continue

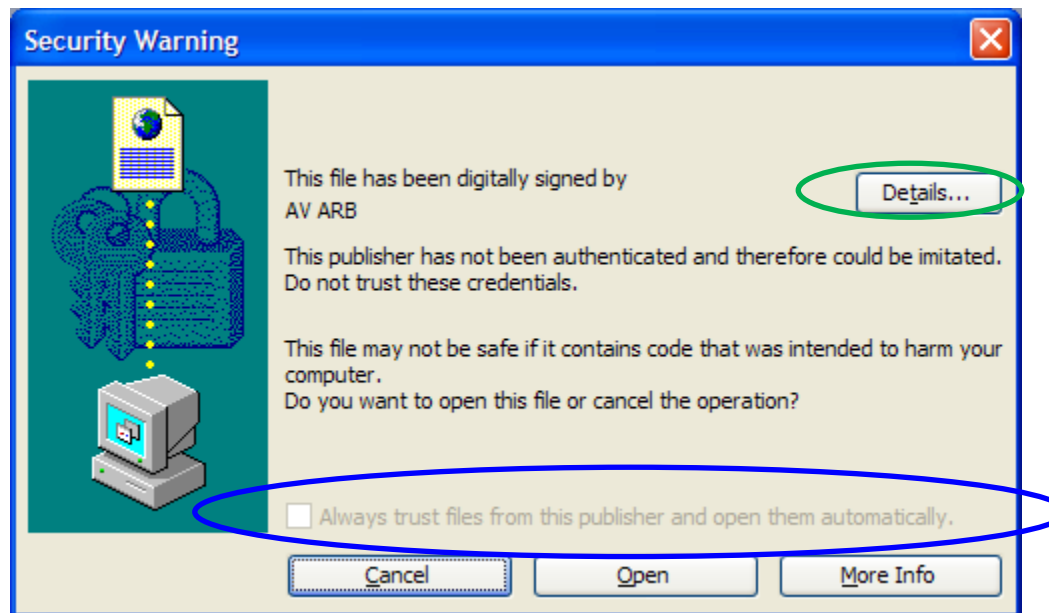
14. Access will require closing and re-opening the EMFAC2011-SG database for options to take effect



15. Close the SG Module to complete the installation procedure

6.2 MICROSOFT® OFFICE 2003 USERS:

1. Double Click on the <EMFAC2011-SG (Ver 1.1).mdb> file to open it
2. First time users using Microsoft® Office 2003 may get a Security Warning for authorizing the digital signature “AV ARB”:

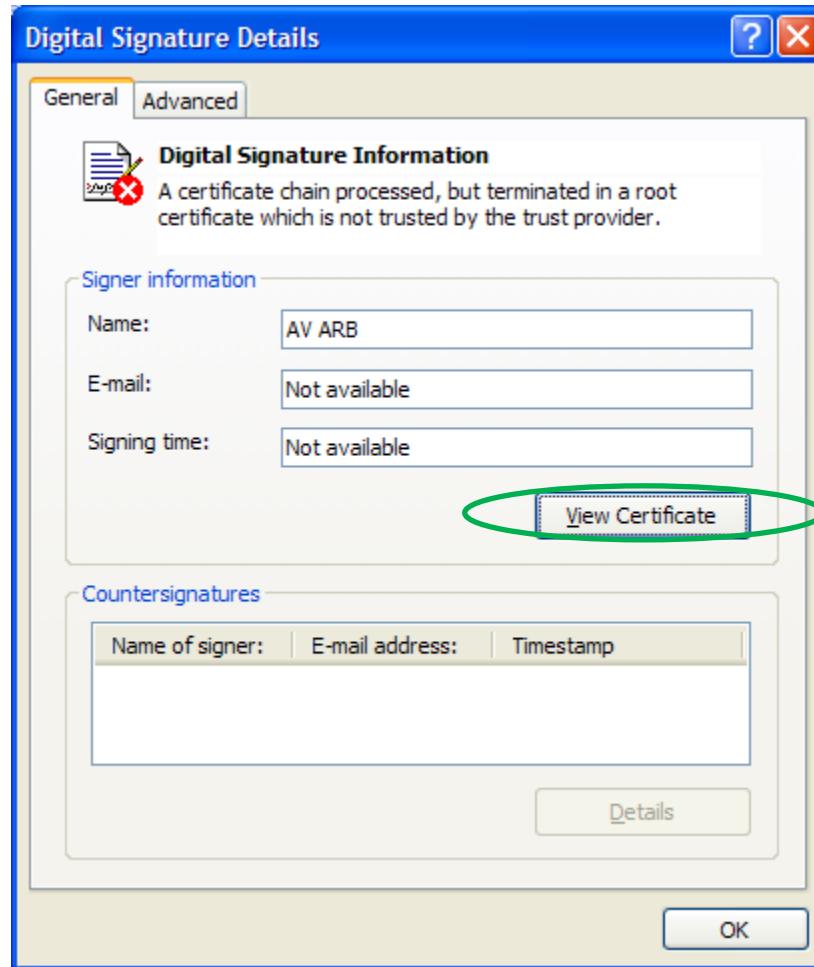


If the ‘Always trust files from this publisher and open the automatically’ option is available, check the option and click ‘Open’

(If the check box is checked, the following steps need not be completed)

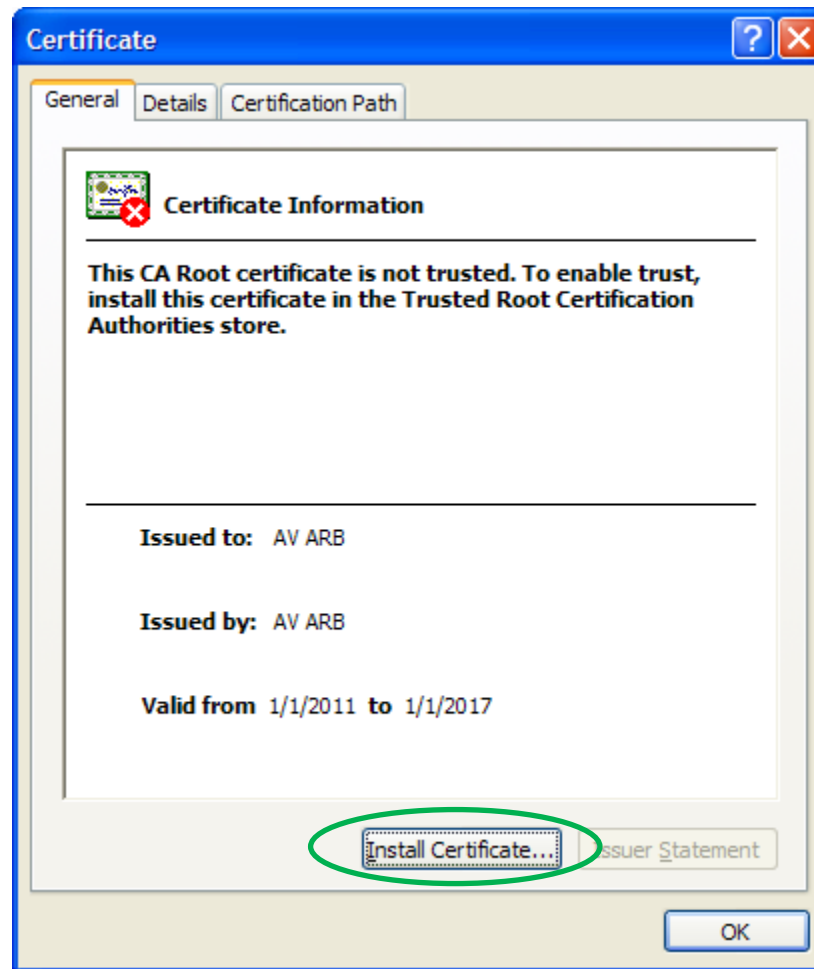
3. Click on the ‘Details’ button

4. The 'Digital Signature Details' for the digital signature "AV ARB" will open up



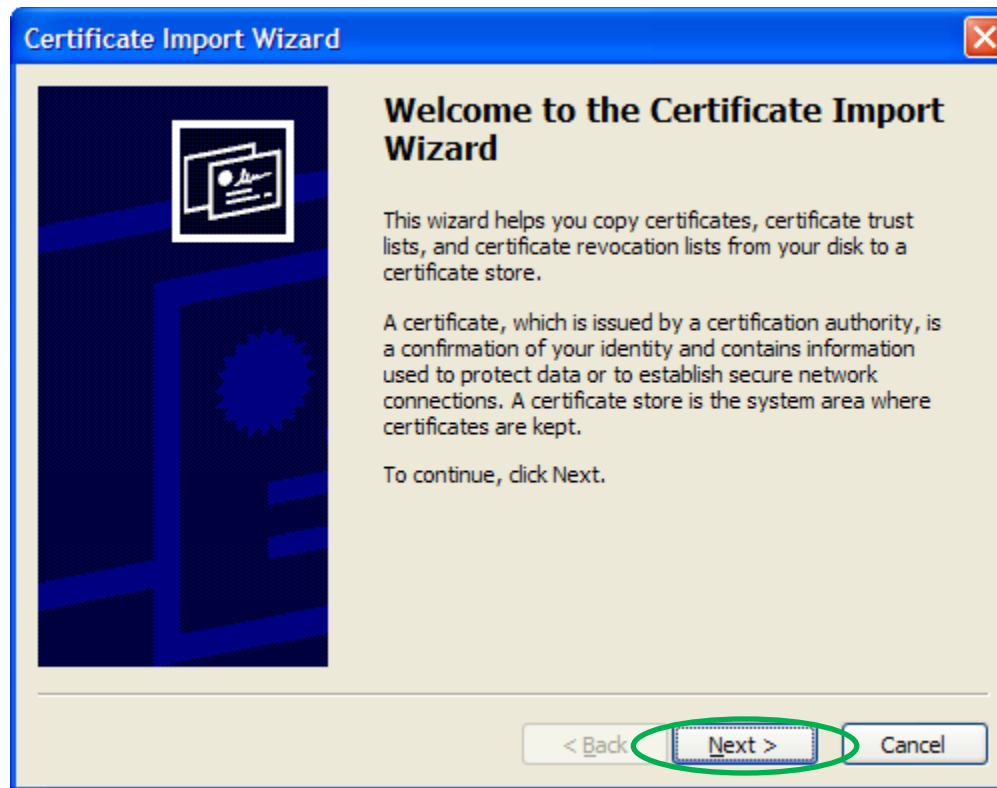
5. Click the 'View Certificate' button

6. The 'Certificate Information' will open up for the digital signature "AV ARB"



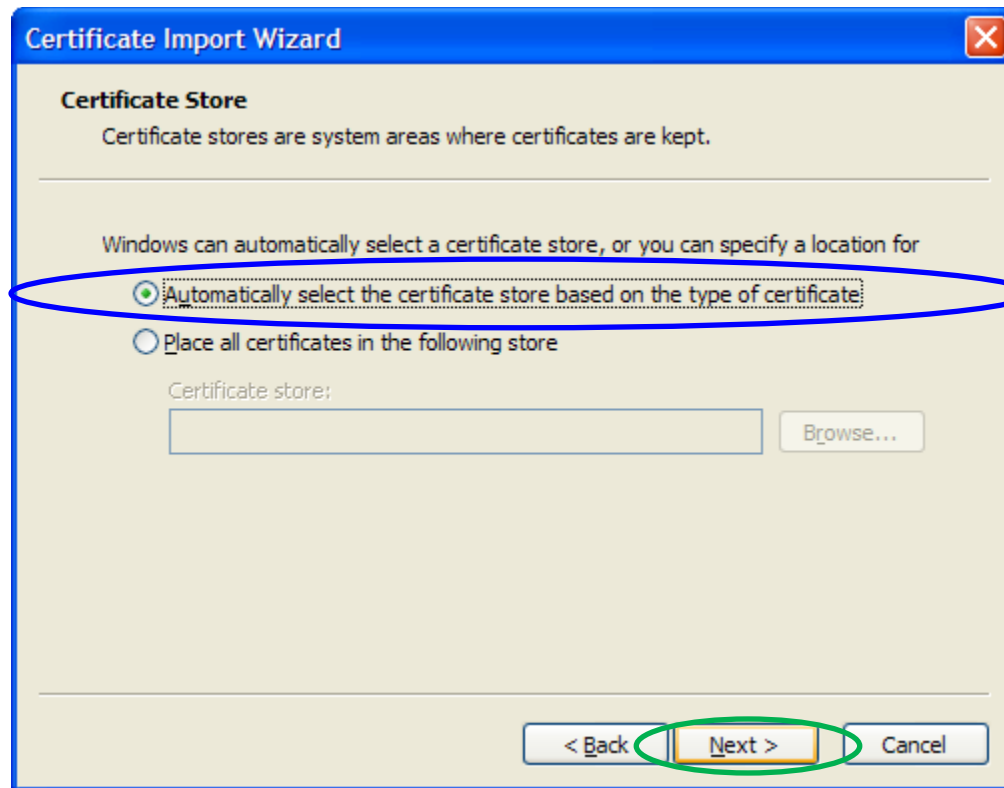
7. Click 'Install Certificate' button to install the digital signature "AV ARB"

8. The 'Certificate Import Wizard' will open

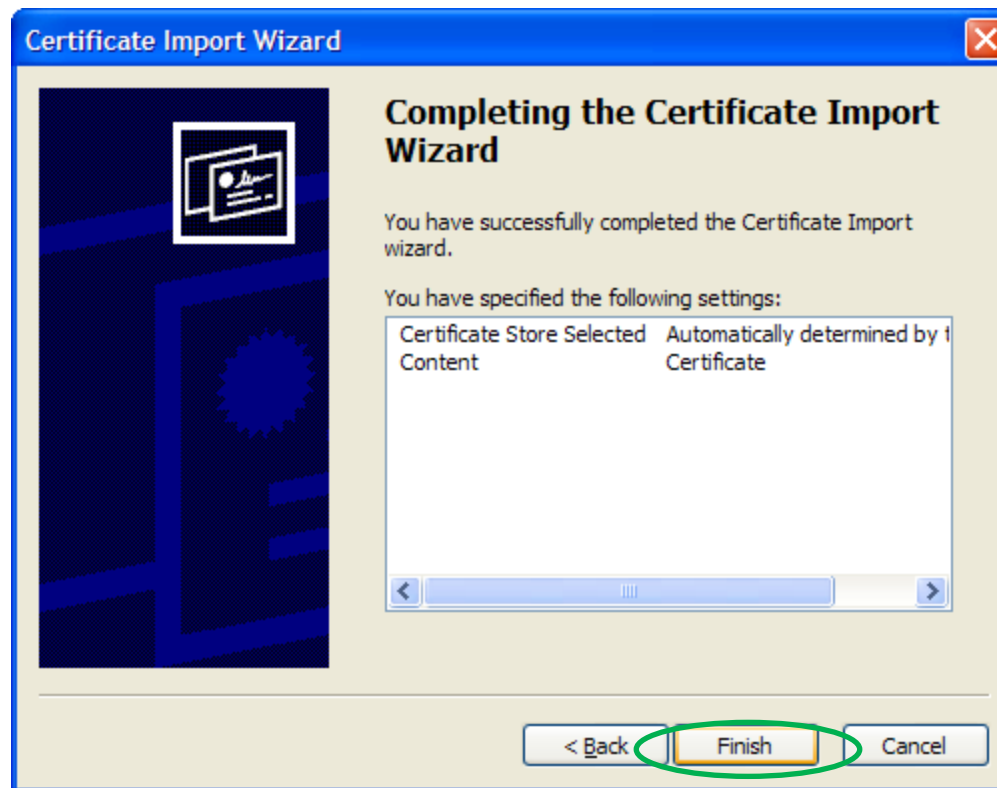


9. Click 'Next'

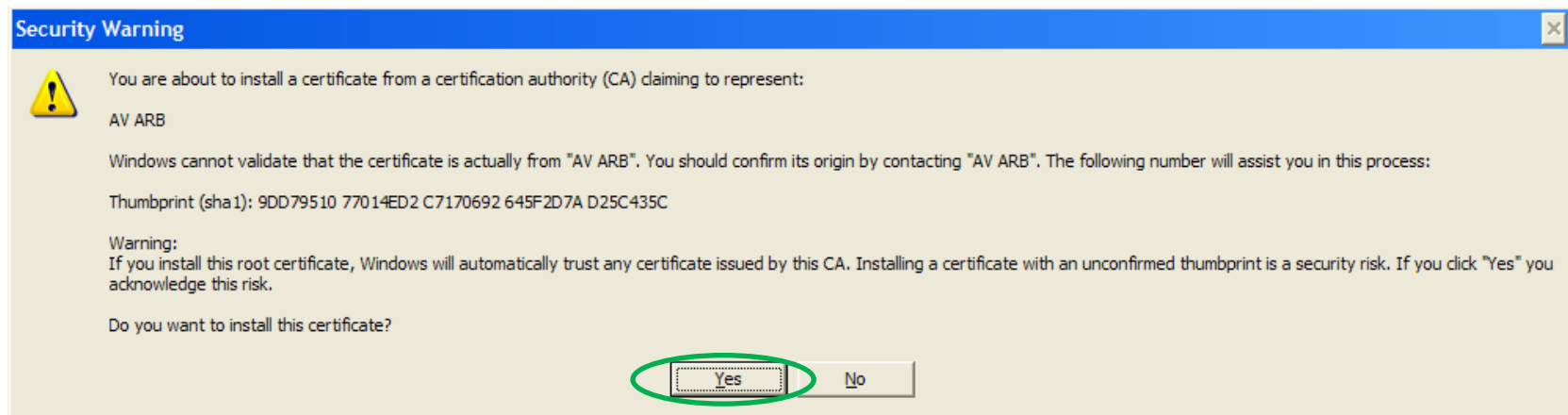
10. Select 'Automatically select the certificate store based on the type of certificate', and click 'Next'



11. Click 'Finish'



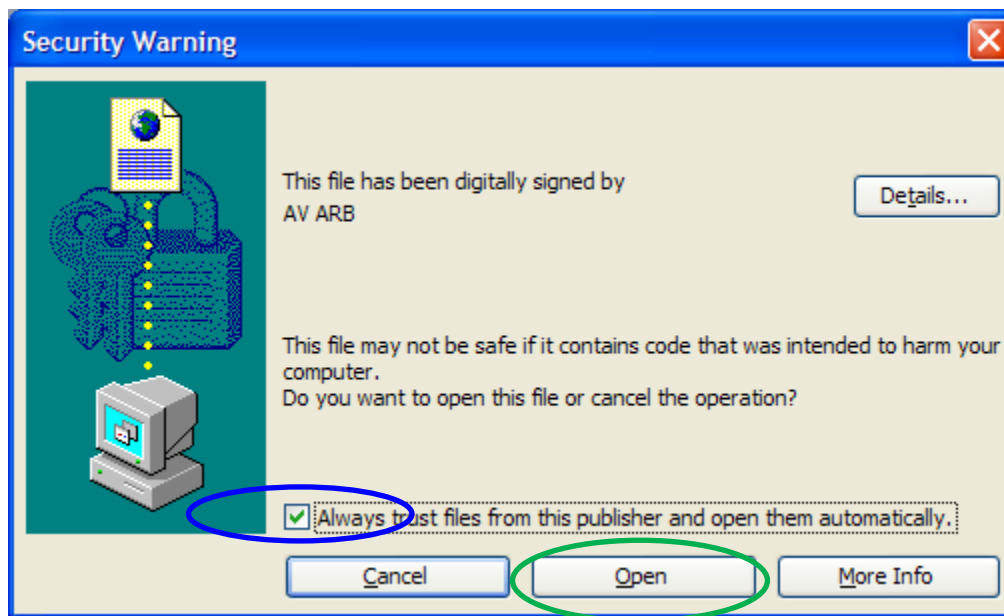
12. A final security warning will be displayed. Click 'Yes'



13. Click 'OK'



14. The Security Warning will show again, and the 'Always trust files from this publisher and open the automatically' option will be available. Check the option (to authorize MS Access documents with the digital signature "AV ARB") and click 'Open'

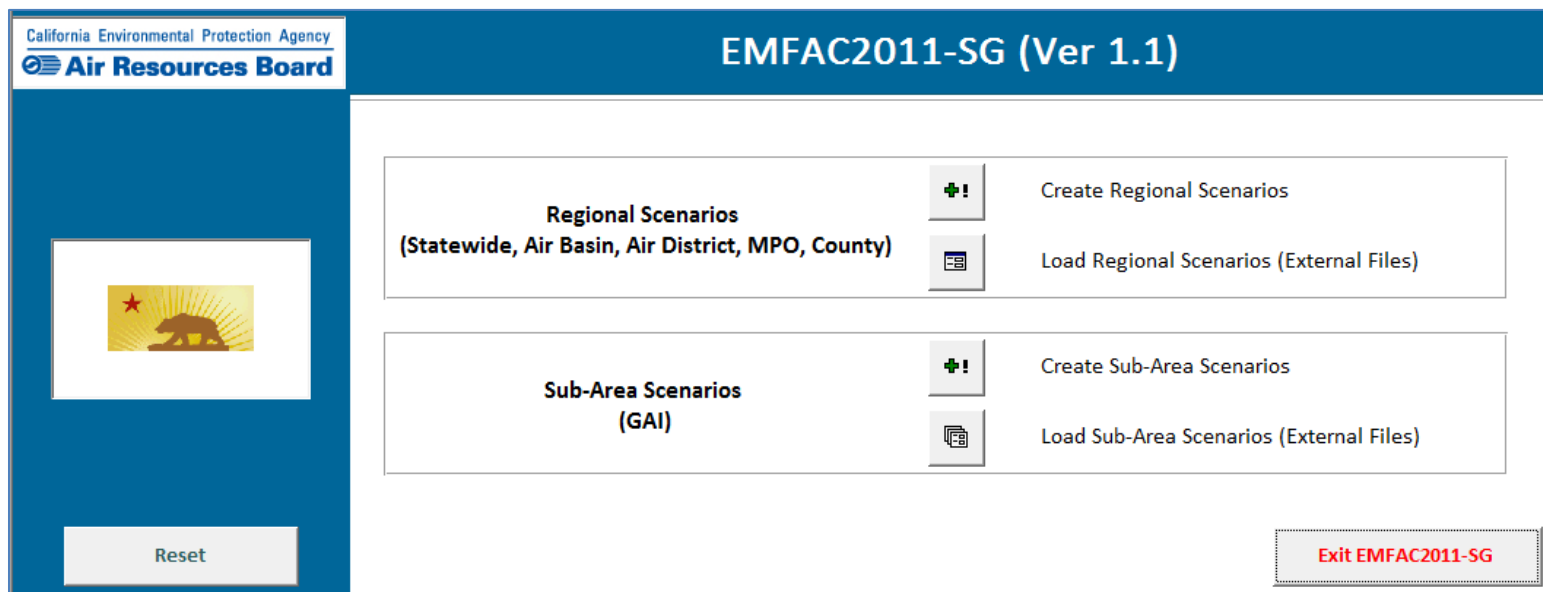


7.0 MODEL OPERATION

Open the file < C:\EMFAC2011-SG (Ver 1.1)\EMFAC2011-SG (Ver 1.1).mdb>

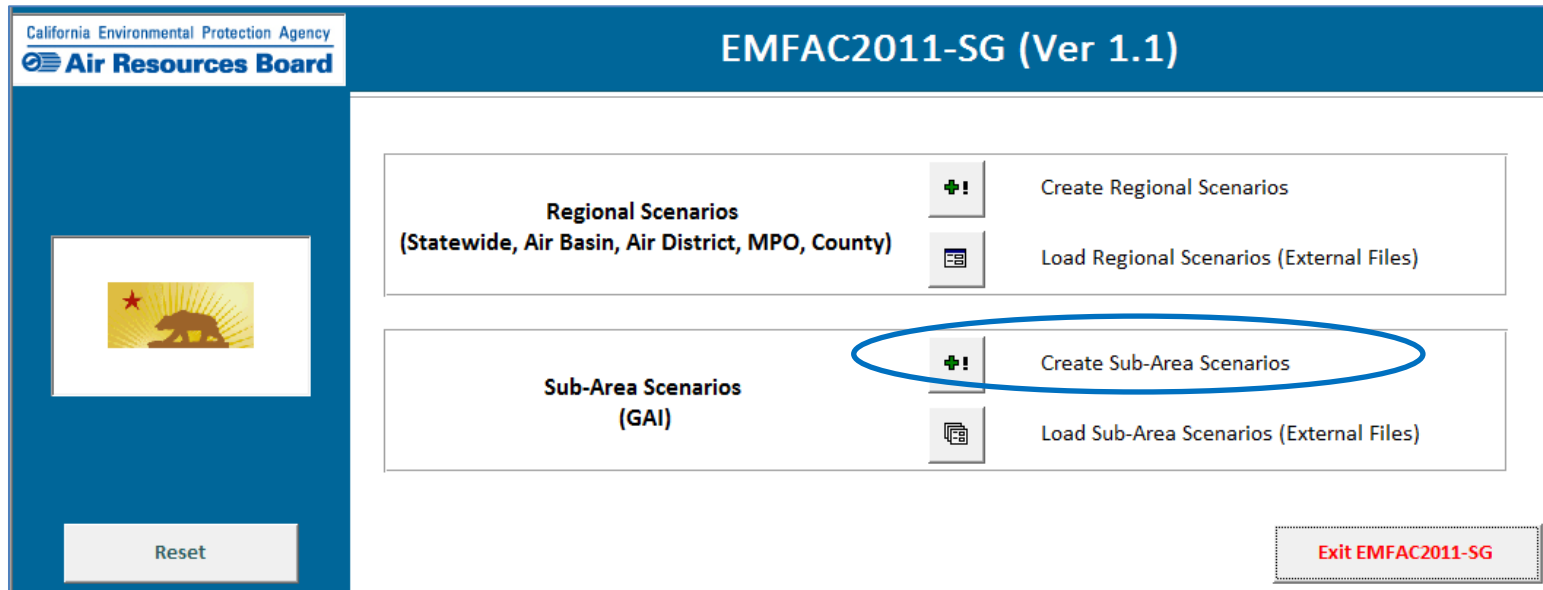
EMFAC2011-SG allows users to load scenarios in two different ways:

1. Create New Scenarios: Users can create new scenarios using the Graphical User Interface (GUI)
2. Load Existing Scenarios (External Files): Users can load scenarios from an external Excel file (.xls)



7.1 CREATE SUB-AREA SCENARIOS

1. Click on the 'Create Sub-Area Scenarios' button on the Master Switchboard page





2. Main page will open


3. Click on the 'Enter Model Inputs' button

California Environmental Protection Agency
Air Resources Board

EMFAC2011-SG (Ver 1.1)



 Enter Model Inputs

 Enter VMT by Vehicle and/or Speed Profiles

Verify Speed Data Quality Save Scenarios Execute Model

- 1 Import Model Inputs
- 2 Import EMFAC Inventory
- 3 Import Speed Profiles
- 4 Process Data
- 5 Save Model Output

Reset /
Return to Main Menu New Scenario Exit EMFAC2011-SG

4. The 'Model Inputs' page will pop-up.

EMFAC2011-SG - Model Inputs

Group:

Area:

Scenario:

Sub-Area:

Calendar Year:

Season:

Title:

VMT Profile:

VMT by Vehicle Category:

Speed Profile:

New Total VMT (miles/day):

[Reset / Return to Main Menu](#) [Save and Create Template for Input Data \(Speed and VMT by Vehicle Category\)](#) [Save and Continue](#)

[Create Default](#) [Use EMFAC Default](#)

5. Select the model inputs from drop down box [highlighted in green]

- Once the Sub-Area, Calendar year and Season inputs are selected, the Default Title and Default EMFAC VMT can be called using the 'Create' buttons [highlighted in blue]

6. The user is required to select/enter information in every field (sample below)

EMFAC2011-SG - Model Inputs

Group:

Area:

Scenario:

Sub-Area:

Calendar Year:

Season:

Title: [Create Default](#)

VMT Profile:

VMT by Vehicle Category:

Speed Profile:

New Total VMT (miles/day): [Use EMFAC Default](#)

[Reset / Return to Main Menu](#) [Save and Create Template for Input Data \(Speed and VMT by Vehicle Category\)](#) [Save and Continue](#)

7. After selecting/entering all input fields, the user can add additional scenarios by clicking on the highlighted button at the bottom of the 'Model Inputs' page:

The screenshot displays the 'EMFAC2011-SG - Model Inputs' web form. The form contains several input fields and dropdown menus for configuring model parameters. A callout box highlights a specific button in the bottom right corner of the form.

Form Fields:

- Group: 1
- Area: -
- Scenario: 1
- Sub-Area: Los Angeles (SC)
- Calendar Year: 2010
- Season: Annual
- Title: Group #1, Scenario #1 - Los Angeles (SC) 2010 Annual [Create Default](#)
- VMT Profile: Default
- VMT by Vehicle Category: Default
- Speed Profile: Default
- New Total VMT (miles/day): 213,633,857.62 [Use EMFAC Default](#)

Buttons:

- [Reset / Return to Main Menu](#)
- [Save and Create Template for Input \(Speed and VMT by Vehicle Category\)](#)

Callout Box:

The callout box points to a button labeled **Add Scenario** (represented by a yellow plus icon) located in the bottom right corner of the form. Below this button is a label **Form View**.

Page Navigation:

Record: 1 of 1

8. After inputting all scenarios, click on the 'Save and Continue' button to close the 'Model Inputs' page and continue

EMFAC2011-SG - Model Inputs

Group: 1

Area: -

Scenario: 1

Sub-Area: Los Angeles (SC)

Calendar Year: 2010

Season: Annual

Title: Group #1, Scenario #1 - Los Angeles (SC) 2010 Annual [Create Default](#)

VMT Profile: Default

VMT by Vehicle Category: Default

Speed Profile: Default

New Total VMT (miles/day): 213,633,857.62 [Use EMFAC Default](#)

[Reset / Return to Main Menu](#) [Save and Create Template for Input Data \(Speed and VMT by Vehicle Category\)](#) [Save and Continue](#)

9. EMFAC2011-SG also provides user assistance for entering the “Speed Profiles” and “VMT by Vehicle Category” data by creating standard (empty) templates for all required data points for ‘User Defined’ runs. Click on the ‘Save and Create Template for Input Data’ button to close the ‘Model Inputs’ page and create the template file (.xls format)

EMFAC2011-SG - Model Inputs

Group:

Area:

Scenario:

Sub-Area:

Calendar Year:

Season:

Title: [Create Default](#)

VMT Profile:

VMT by Vehicle Category:

Speed Profile:

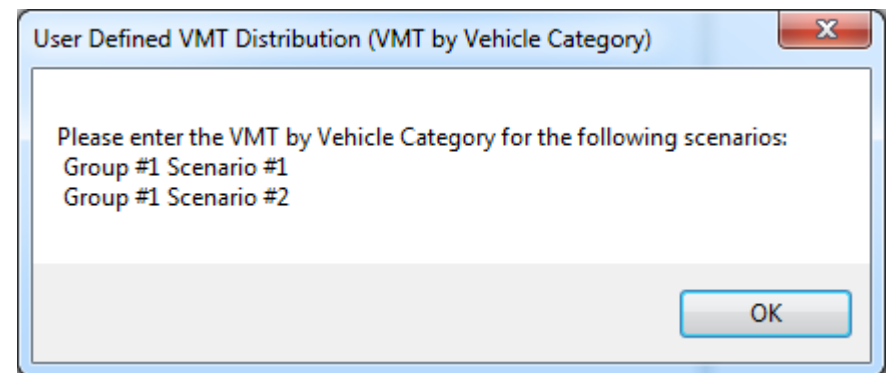
New Total VMT (miles/day): [Use EMFAC Default](#)

[Reset / Return to Main Menu](#) [Save and Create Template for Input Data \(Speed and VMT by Vehicle Category\)](#) [Save and Continue](#)

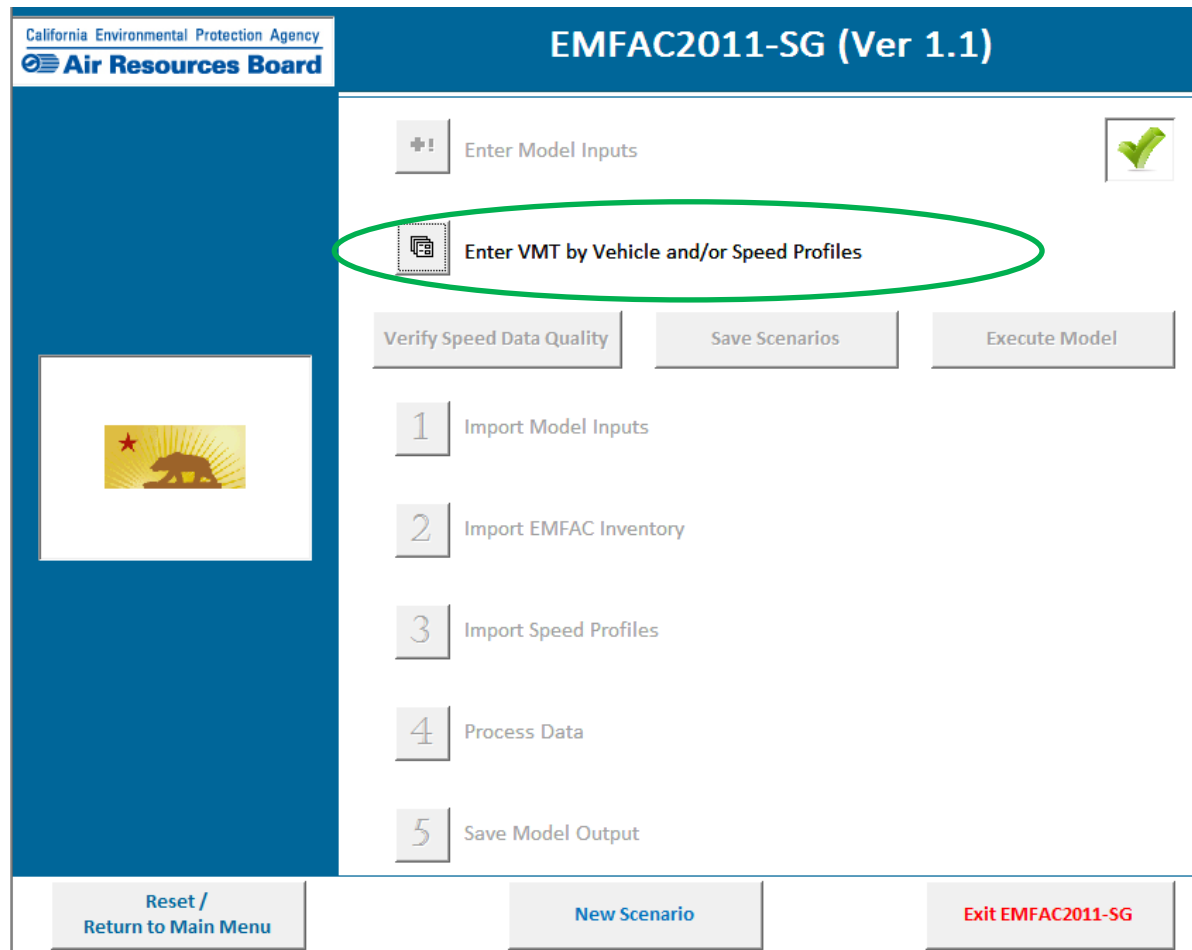
10. If the user elected “User” selection for Speed Profile or clicked “Import VMT by Vehicle Category” checkbox for any scenario, then the model requires the user to provide the Speed Profile and/or External VMT inputs

(Step 10 is omitted if the user selects ‘Default’ Speed Profiles and ‘Default’ VMT Profile for all scenarios)

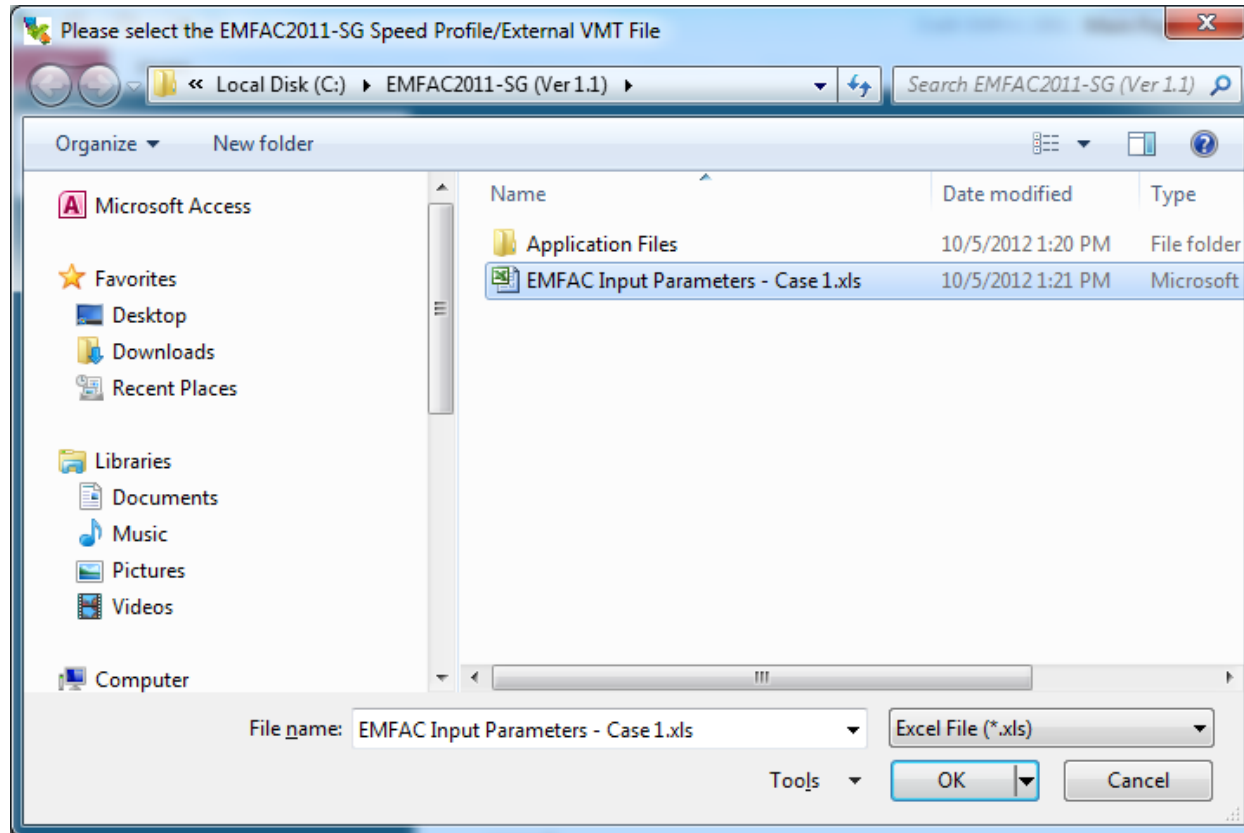
10.1. Message boxes pop up with information on the scenarios that require external Speed Profile and/or External VMT by Vehicle Category (Click OK)



10.2. Click on 'Enter VMT by Vehicle and/or Speed Profiles' button



10.3. Select the Excel file (.xls) containing the Speed Profile and/or External VMT by Vehicle Category data, and click 'Open'



7.2 CREATE REGIONAL SCENARIOS

1. Click on the 'Create Regional Scenarios' button on the 'Master Switchboard' page

California Environmental Protection Agency
Air Resources Board

EMFAC2011-SG (Ver 1.1)

Regional Scenarios
(Statewide, Air Basin, Air District, MPO, County)

Create Regional Scenarios

Load Regional Scenarios (External Files)

Sub-Area Scenarios
(GAI)

Create Sub-Area Scenarios

Load Sub-Area Scenarios (External Files)

Reset

Exit EMFAC2011-SG

2. The 'Scenario Builder' page will open

EMFAC2011-SG - Scenario Builder

Group:

Area Type:

Area:

CalYr:

Season:

[Reset / Return to Main Menu](#) [Default Model Run](#) [User Defined Model Run](#) [Save and Continue](#)

3. Select all the model inputs from drop down boxes [highlighted in green]

4. The user is required to select information in every field (sample below)

EMFAC2011-SG - Scenario Builder

Group:

1

Area Type:

State

Area:

California

CalYr:

2020

Season:

Annual

Reset /
Return to Main Menu

Default Model Run

User Defined Model Run

Save and Continue

5. After selecting/entering all input fields, the user can add additional Region Scenarios by clicking on the highlighted button at the bottom of the 'Scenario Builder' page:

EMFAC2011-SG - Scenario Builder

Group:


Area Type:

Area:


CalYr:

Season:

[Reset / Return to Main Menu](#) [Default Model Run](#) [User Defined](#)

Record: 1 of 1 

Form View

Record: 1 of 1  No Filter Search

6. After inputting all Regional Scenarios, click on the 'Default Model Run' or 'User Defined Model Run' to continue

EMFAC2011-SG - Scenario Builder

Group:

Area Type:

Area:

CalYr:

Season:

[Reset / Return to Main Menu](#) [Default Model Run](#) [User Defined Model Run](#) [Save and Continue](#)

6.1. If the user selects 'User Defined Model Run' (blue), the 'Model Inputs' page will open up. Continue by following Step 7.1.4

7.3 LOAD/RUN EXISTING SCENARIOS (EXTERNAL FILES)

EMFAC2011-SG input files are saved as Microsoft Excel 2003 files (.xls).

1. Click on the 'Load Scenarios' button

- 'Load Regional Scenarios' option requires the input file to contain the base inputs for the Regional Scenarios
 - If the input file also contains the Sub-Area Scenarios, the model verifies if all required Sub-Area Scenarios for the Regional Scenario are available. If so, then the users have the option to run the sub-area scenarios contained in the input file, or use the regional scenarios parameters to create new/different model runs
 - If the input file doesn't contain the Sub-Area Scenarios, then the users can only create new model runs using the Regional Scenarios
- 'Load Sub-Area Scenarios' option requires the input file to contain base inputs for the Sub-Area Scenarios

California Environmental Protection Agency
Air Resources Board

EMFAC2011-SG (Ver 1.1)

Regional Scenarios
(Statewide, Air Basin, Air District, MPO, County)

+! Create Regional Scenarios

Load Regional Scenarios (External Files)

Sub-Area Scenarios
(GAI)

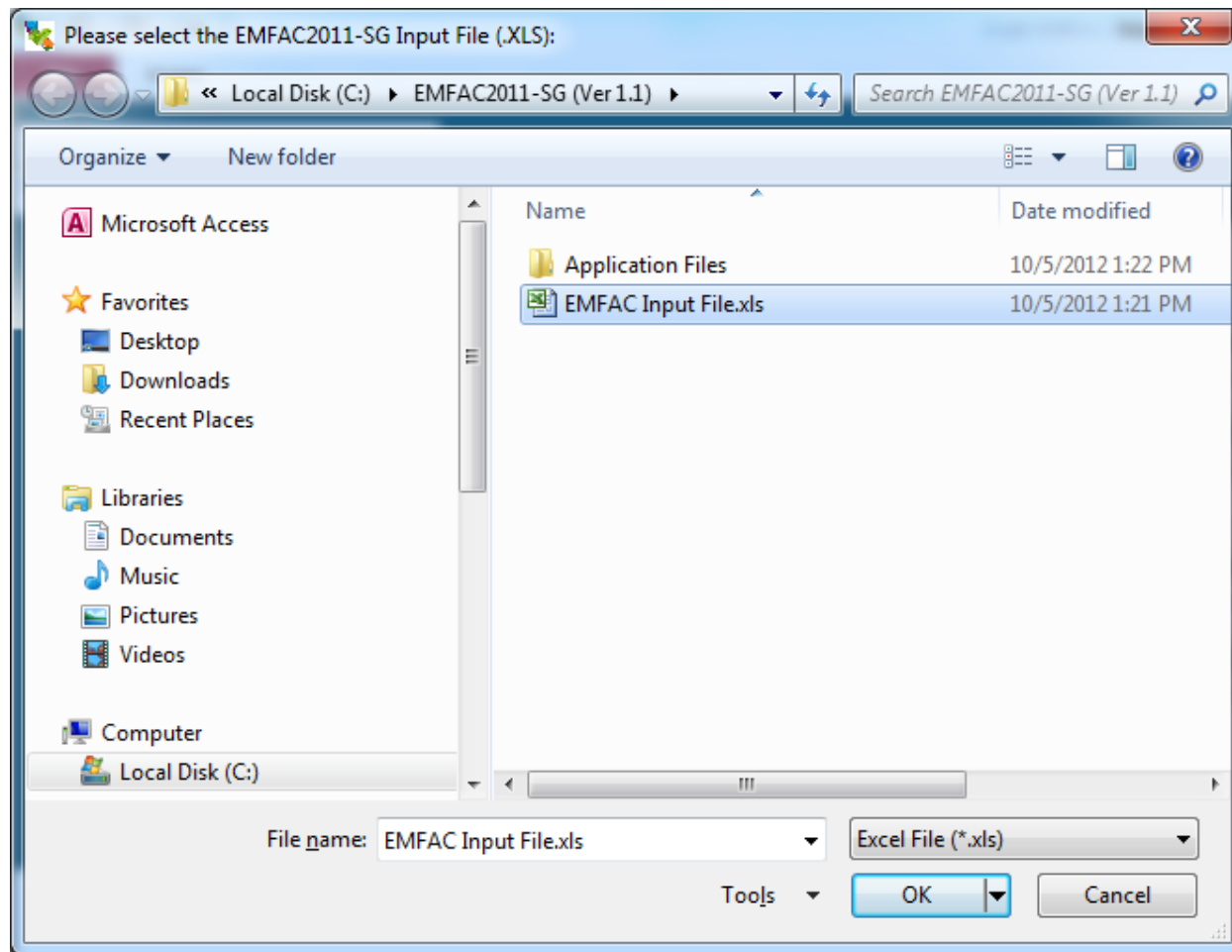
+! Create Sub-Area Scenarios

Load Sub-Area Scenarios (External Files)

Reset

Exit EMFAC2011-SG

2. A file selection/browser window will open up. Browse to the input data file folder, select the file, and click 'OK'



3. If 'Regional Scenarios' are loaded, then the 'Scenario Builder' page will open up, and display all the loaded regional scenarios. Click 'Save and Continue'

EMFAC2011-SG - Scenario Builder

Group:

1

Area Type:

MPO

Area:

SCAG

CalYr:

2008

Season:

Annual

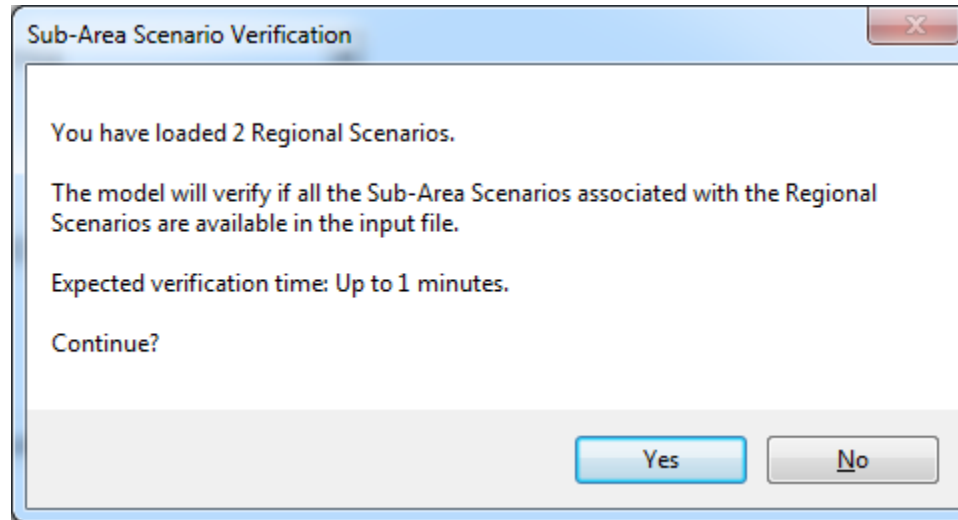
Reset /
Return to Main Menu

Default Model Run

User Defined Model Run

Save and Continue

4. The 'Sub-Area Scenario Verification' window will open up.
 - The model verifies if all required Sub-Area Scenarios for the Regional Scenario are available.

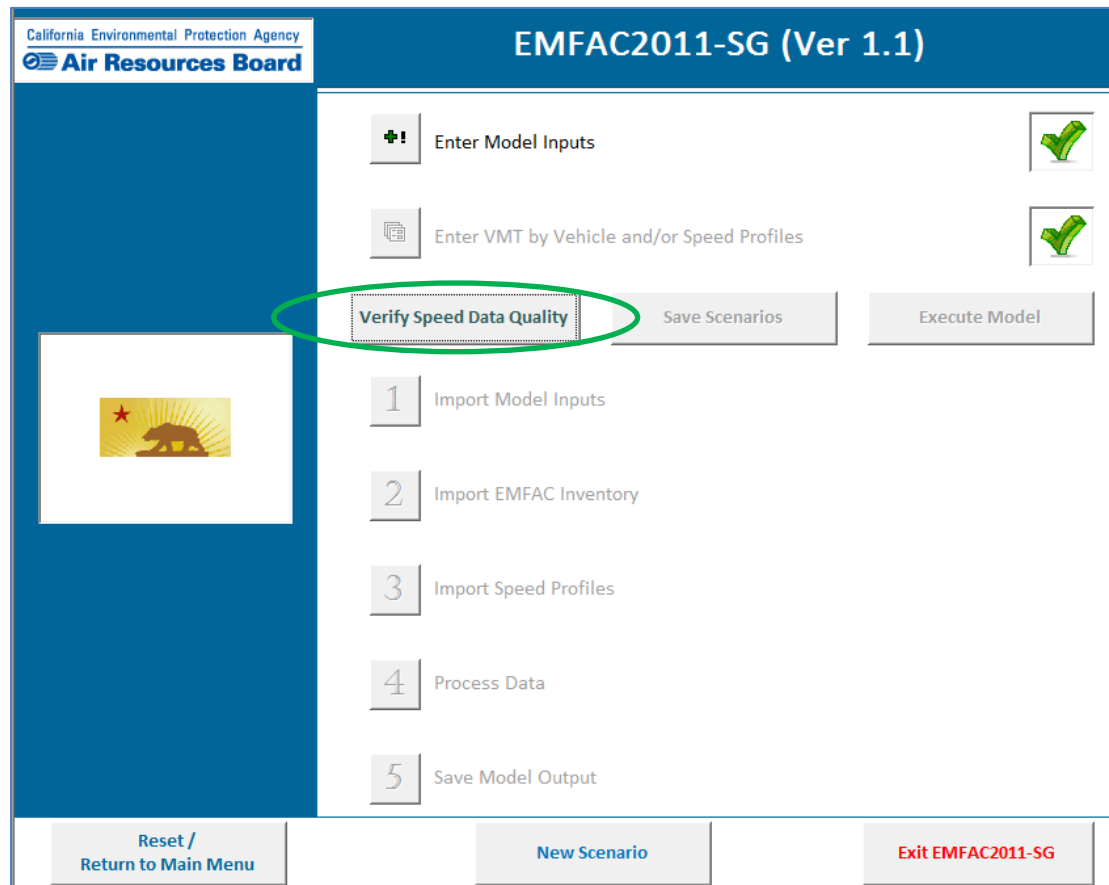


5. To continue with the verification process, Click 'Yes'
 - To cancel the verification process, and return to the 'Scenario Builder' page, Click 'No'

8.0 MODEL VERIFICATION

If the user elected user-defined Speed Profile for any scenario, then the speed-profile inputs are verified to ensure that profiles sum up to 100% for each vehicle category (this step is omitted if the user selects default speed profiles).

1. Click on the 'Verify Speed Data Quality' button



2. The 'Verify Speed Inputs' page will open

If the user entered user-defined speed profile using an external file, the 'Verify Speed Inputs' database will be populated.

- If the Speed Profiles for all the Vehicle and Technology cases add up to 100%, the 'Continue' button will be enabled
 - To proceed, click 'Continue'
- If the Speed Profiles for all cases are not available or do not add up to 100%, only the 'Reset' button will be enabled
 - The Vehicle and Technology cases will be identified with an "**Error**" entry in the 'Error Check' column
 - The user will need to correct the speed profile in the input data file, and re-import the scenario file.
 - To re-import the corrected speed profile, click the 'Reset' button

EMFAC2011-SG - Verify Speed Inputs										
		<input type="button" value="Reset"/>		51 Veh + Tech cases have Speed Errors [Speed Fractions are not available or don't add up to 100%] Please Reset and Reload the corrected speed profiles					<input type="button" value="Continue"/>	
Group	Area	Scenario	Sub-Area	CalYr	Season	Title	Speed Profile	Veh + Tech	Speed Total	Speed Check
1	California	22	Los Angeles (SC)	2000	Annual	Group #1 (California), Scenario #22 - Lo	User	All Other Buses - DSL	0.00%	Error
1	California	22	Los Angeles (SC)	2000	Annual	Group #1 (California), Scenario #22 - Lo	User	LDA - DSL	0.00%	Error
1	California	22	Los Angeles (SC)	2000	Annual	Group #1 (California), Scenario #22 - Lo	User	LDA - GAS	0.00%	Error
1	California	22	Los Angeles (SC)	2000	Annual	Group #1 (California), Scenario #22 - Lo	User	LDT1 - DSL	0.00%	Error
1	California	22	Los Angeles (SC)	2000	Annual	Group #1 (California), Scenario #22 - Lo	User	LDT1 - GAS	0.00%	Error
1	California	22	Los Angeles (SC)	2000	Annual	Group #1 (California), Scenario #22 - Lo	User	LDT2 - DSL	0.00%	Error
1	California	22	Los Angeles (SC)	2000	Annual	Group #1 (California), Scenario #22 - Lo	User	LDT2 - GAS	0.00%	Error
1	California	22	Los Angeles (SC)	2000	Annual	Group #1 (California), Scenario #22 - Lo	User	LHD1 - DSL	0.00%	Error
1	California	22	Los Angeles (SC)	2000	Annual	Group #1 (California), Scenario #22 - Lo	User	LHD1 - GAS	0.00%	Error
1	California	22	Los Angeles (SC)	2000	Annual	Group #1 (California), Scenario #22 - Lo	User	LHD2 - DSL	0.00%	Error
1	California	22	Los Angeles (SC)	2000	Annual	Group #1 (California), Scenario #22 - Lo	User	LHD2 - GAS	0.00%	Error
1	California	22	Los Angeles (SC)	2000	Annual	Group #1 (California), Scenario #22 - Lo	User	MCV - GAS	0.00%	Error

9.0 MODEL EXECUTION

1. The first step to model execution is to save the scenarios.
2. At this stage, the 'Save Scenario' button will be activated. Click on the button to save the inputs and continue.

California Environmental Protection Agency
Air Resources Board

EMFAC2011-SG (Ver 1.1)

Enter Model Inputs

Enter VMT by Vehicle and/or Speed Profiles

Verify Speed Data Quality

Save Scenarios

Execute Model

1 Import Model Inputs

2 Import EMFAC Inventory

3 Import Speed Profiles

4 Process Data

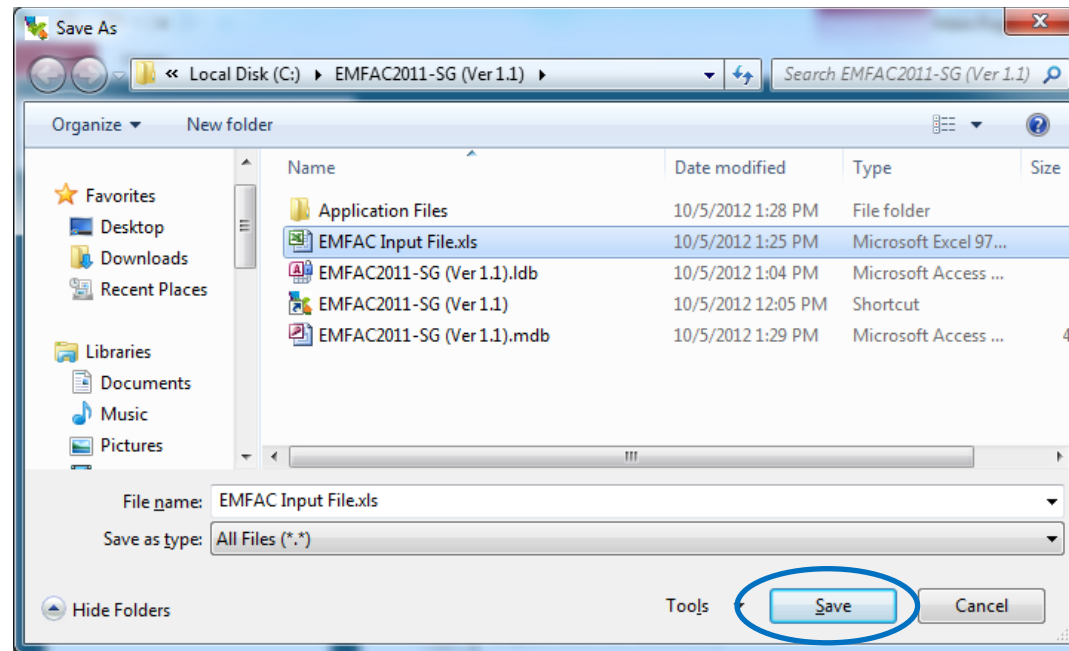
5 Save Model Output

Reset / Return to Main Menu

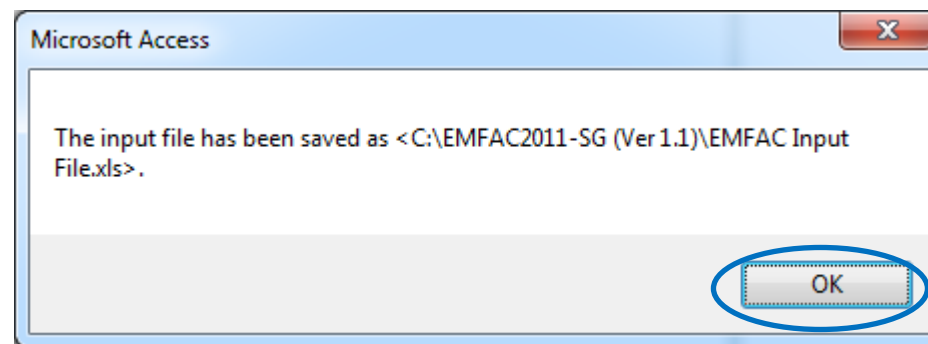
New Scenario

Exit EMFAC2011-SG


3. The pop window will open up, allowing the user to save the input file. User can only enter the file name (the input file will be automatically saved as an Microsoft Excel 2003 file [.xls]). Enter the desired file name and click 'Save' to continue.




4. The input file location message will open. Click 'OK' to continue




5. The 'Execute Model' button will be activated. Click on the button to start the processing.

California Environmental Protection Agency
 **Air Resources Board**

EMFAC2011-SG (Ver 1.1)



 Enter Model Inputs

 Enter VMT by Vehicle and/or Speed Profiles

Verify Speed Data Quality

Save Scenarios

Execute Model



6. The 'Model Execution Options' page will open, and contains the following information/options:

- 'EMFAC2011-SG Processing Information' with the scenario information and expected model run time.
 - The run time is only an estimate, and the process could vary depending on system configurations.
 - Option to 'Export Default Input Parameters' [in XLS or CSV Format]
 - The Input Parameters file is denoted by "EMFAC2011-SG Input Parameters" and contains the Input Filename
 - Output Options (EMFAC2011 output is standard):
 - Option to 'Create Summary Outputs'
 - Option to 'Create EMFAC2007 Outputs'
 - Option to 'Create SB375 Outputs'
 - Option to 'Create CTF Outputs'
 - Option to 'Create Separate Output Files for Each Regional Scenario'
 - Option to select Output Format [in XLS or CSV Format]
7. Click 'Start' to begin model execution
- Click 'Cancel' to cancel model execution

EMFAC2011-SG - Model Execution Options

EMFAC2011-SG Processing Information

Number of Scenarios:	138
Expected model run time:	34.5 minutes

Input Parameters

☐ Export Default Input Parameters

☒ XLS Format (All Inputs) [Limit 1,250 Scenarios]

☐ CSV Format (Speed and VMT by Vehicle Category)

Model Outputs

☐ Generate Summary Outputs☐ Generate SB375 Outputs

☐ Generate EMFAC2007 Outputs☐ Generate CTF Outputs (CSV Only)

☐ Create Separate Output Files for Each Regional Scenario

Output Format

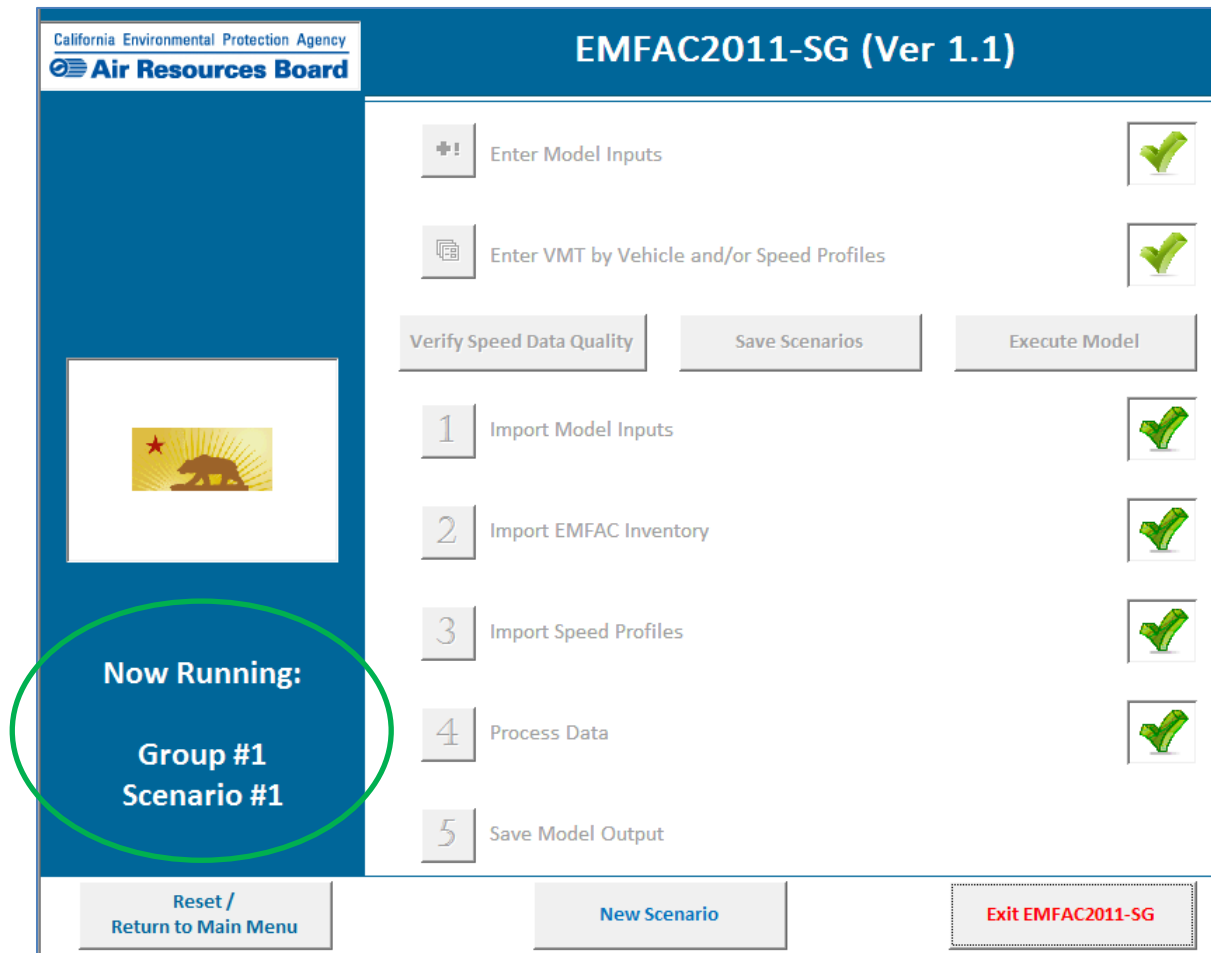
☒ XLS Format [Limit 1,250 Scenarios]

☐ CSV Format

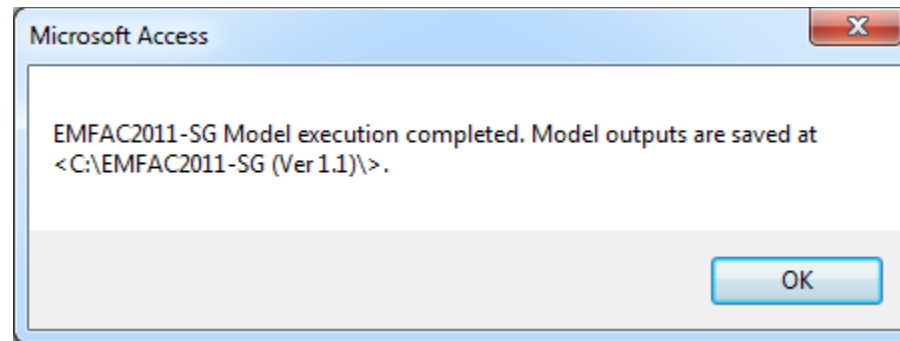
Cancel

Start

8. As the model executes the scenarios, it indicates the Model Processing Status including the “Current Processing Scenario”, and the “Processing Stage”:



9. After the model completes the processing for all the scenarios, a pop-up message shows the output location (same as the Input file location).



10.0 DEFAULT MODEL OUTPUTS

The model outputs are denoted by “EMFAC2011-SG Output” and contain the Input Filename (e.g. if the Input Filename is “Sample”, the Output file will be called “EMFAC2011-SG Output - Sample”). The output files are created in Microsoft® Excel format (.xls), and contain the following variables:

- Group
- Area
- Scenario
- Sub-Area
- Calendar Year
- Season
- Title
- Veh & Tech
- EMFAC2007 Category
- Vehicle Population
- VMT (miles/average workday)
- Trips (trips/average workday)
- TOG Emissions (tons/average workday)
- ROG Emissions (tons/average workday)
- CO Emissions (tons/average workday)
- NO_x Emissions (tons/average workday)
- CO₂ Emissions (tons/average workday)
- CO₂ Emissions (including Pavley I and LCFS adjustments) (tons/average workday)
- PM₁₀ Emissions (tons/average workday)
- PM_{2.5} Emissions (tons/average workday)
- SO_x Emissions (tons/average workday)
- Fuel Consumption (1000 gal/day): DSL and GAS

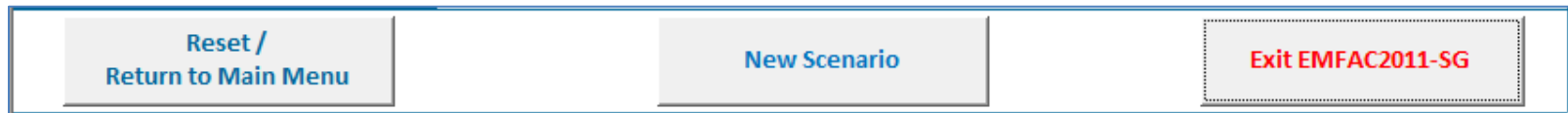
The following process emissions are generated for each pollutant:

- All Pollutants - Running Exhaust, Idling Exhaust, Starting Exhaust, Total Exhaust
- ROG and TOG - Diurnal Losses, Hot-Soak Losses, Running Losses, Resting Losses, Total
- PM10 and PM2.5 - Break wear, Tire wear, Total

The model appends the outputs for all scenarios defined in an input file in the same output file. The model also aggregates the results of all the scenarios that are classified in the same group, and appends the aggregated output for the group in the same file (along with the outputs for all sub-areas).

- For a single statewide regional case, the model will create a single Excel output table containing 70 sets of outputs (69 sub-area/GAI results, and 1 Statewide-totals result). The number of data rows will depend on number of Vehicle Categories applicable to each sub-area.

11.0 OTHER FUNCTIONS



“Reset” and “Reset / Return to Main Menu”

- This button can be clicked at any time before or after model execution to reset all inputs and return to the Main Menu

“New Scenario”

- Users can click on the ‘New Scenario’ button at the bottom of the ‘Main Switchboard’ to create a new scenario
- This button can also be clicked any time before or after model execution to reset the scenarios

“Exit EMFAC2011-SG”

- This button resets all inputs, and exits the model

Appendix A – Sub-Area Classification

Sub-Area	County	Air Basin	Air District	MPO
Alameda (SF)	Alameda	San Francisco Bay Area	Bay Area AQMD	MTC
Alpine (GBV)	Alpine	Great Basin Valley	Great Basin Unified APCD	
Amador (MC)	Amador	Mountain Counties	Amador County APCD	
Butte (SV)	Butte	Sacramento Valley	Butte County AQMD	BCAG
Calaveras (MC)	Calaveras	Mountain Counties	Calaveras County APCD	
Colusa (SV)	Colusa	Sacramento Valley	Colusa County APCD	
Contra Costa (SF)	Contra Costa	San Francisco Bay Area	Bay Area AQMD	MTC
Del Norte (NC)	Del Norte	North Coast	North Coast Unified AQMD	
El Dorado (LT)	El Dorado	Lake Tahoe	El Dorado County APCD	TMPO
El Dorado (MC)	El Dorado	Mountain Counties	El Dorado County APCD	SACOG
Fresno (SJV)	Fresno	San Joaquin Valley	San Joaquin Valley Unified APCD	COFCG
Glenn (SV)	Glenn	Sacramento Valley	Glenn County APCD	
Humboldt (NC)	Humboldt	North Coast	North Coast Unified AQMD	
Imperial (SS)	Imperial	Salton Sea	Imperial County APCD	SCAG
Inyo (GBV)	Inyo	Great Basin Valley	Great Basin Unified APCD	
Kern (MD)	Kern	Mojave Desert	Kern County APCD	KCOG
Kern (SJV)	Kern	San Joaquin Valley	San Joaquin Valley Unified APCD	KCOG
Kings (SJV)	Kings	San Joaquin Valley	San Joaquin Valley Unified APCD	KCAG
Lake (LC)	Lake	Lake County	Lake County APCD	
Lassen (NEP)	Lassen	Northeast Plateau	Lassen County APCD	
Los Angeles (MD)	Los Angeles	Mojave Desert	Antelope Valley APCD	SCAG
Los Angeles (SC)	Los Angeles	South Coast	South Coast AQMD	SCAG
Madera (SJV)	Madera	San Joaquin Valley	San Joaquin Valley Unified APCD	MCTC
Marin (SF)	Marin	San Francisco Bay Area	Bay Area AQMD	MTC
Mariposa (MC)	Mariposa	Mountain Counties	Mariposa County APCD	
Mendocino (NC)	Mendocino	North Coast	Mendocino County APCD	
Merced (SJV)	Merced	San Joaquin Valley	San Joaquin Valley Unified APCD	MCAG
Modoc (NEP)	Modoc	Northeast Plateau	Modoc County APCD	
Mono (GBV)	Mono	Great Basin Valley	Great Basin Unified APCD	
Monterey (NCC)	Monterey	North Central Coast	Monterey Bay Unified APCD	AMBAG
Napa (SF)	Napa	San Francisco Bay Area	Bay Area AQMD	MTC
Nevada (MC)	Nevada	Mountain Counties	Northern Sierra AQMD	
Orange (SC)	Orange	South Coast	South Coast AQMD	SCAG
Placer (LT)	Placer	Lake Tahoe	Placer County APCD	TMPO
Placer (MC)	Placer	Mountain Counties	Placer County APCD	SACOG
Placer (SV)	Placer	Sacramento Valley	Placer County APCD	SACOG
Plumas (MC)	Plumas	Mountain Counties	Northern Sierra AQMD	
Riverside (MD/MDAQMD)	Riverside	Mojave Desert	Mojave Desert AQMD	SCAG
Riverside (MD/SCAQMD)	Riverside	Mojave Desert	South Coast AQMD	SCAG
Riverside (SC)	Riverside	South Coast	South Coast AQMD	SCAG
Riverside (SS)	Riverside	Salton Sea	South Coast AQMD	SCAG
Sacramento (SV)	Sacramento	Sacramento Valley	Sacramento Metropolitan AQMD	SACOG
San Benito (NCC)	San Benito	North Central Coast	Monterey Bay Unified APCD	AMBAG
San Bernardino (MD)	San Bernardino	Mojave Desert	Mojave Desert AQMD	SCAG
San Bernardino (SC)	San Bernardino	South Coast	South Coast AQMD	SCAG
San Diego (SD)	San Diego	San Diego	San Diego County APCD	SANDAG
San Francisco (SF)	San Francisco	San Francisco Bay Area	Bay Area AQMD	MTC
San Joaquin (SJV)	San Joaquin	San Joaquin Valley	San Joaquin Valley Unified APCD	SJCOG
San Luis Obispo (SCC)	San Luis Obispo	South Central Coast	San Luis Obispo County APCD	SLOCOG
San Mateo (SF)	San Mateo	San Francisco Bay Area	Bay Area AQMD	MTC
Santa Barbara (SCC)	Santa Barbara	South Central Coast	Santa Barbara County APCD	SBCAG
Santa Clara (SF)	Santa Clara	San Francisco Bay Area	Bay Area AQMD	MTC
Santa Cruz (NCC)	Santa Cruz	North Central Coast	Monterey Bay Unified APCD	AMBAG
Shasta (SV)	Shasta	Sacramento Valley	Shasta County AQMD	SCRTPA
Sierra (MC)	Sierra	Mountain Counties	Northern Sierra AQMD	
Siskiyou (NEP)	Siskiyou	Northeast Plateau	Siskiyou County APCD	
Solano (SF)	Solano	San Francisco Bay Area	Bay Area AQMD	MTC
Solano (SV)	Solano	Sacramento Valley	Yolo/Solano AQMD	MTC
Sonoma (NC)	Sonoma	North Coast	Northern Sonoma County APCD	MTC
Sonoma (SF)	Sonoma	San Francisco Bay Area	Bay Area AQMD	MTC
Stanislaus (SJV)	Stanislaus	San Joaquin Valley	San Joaquin Valley Unified APCD	StanCOG
Sutter (SV)	Sutter	Sacramento Valley	Feather River AQMD	SACOG
Tehama (SV)	Tehama	Sacramento Valley	Tehama County APCD	
Trinity (NC)	Trinity	North Coast	North Coast Unified AQMD	
Tulare (SJV)	Tulare	San Joaquin Valley	San Joaquin Valley Unified APCD	TCAG
Tuolumne (MC)	Tuolumne	Mountain Counties	Tuolumne County APCD	
Ventura (SCC)	Ventura	South Central Coast	Ventura County APCD	SCAG
Yolo (SV)	Yolo	Sacramento Valley	Yolo/Solano AQMD	SACOG
Yuba (SV)	Yuba	Sacramento Valley	Feather River AQMD	SACOG

Appendix B – EMFAC2011 Vehicle Category Classification

Index	EMFAC2011 Veh & Tech	EMFAC2011 Vehicle	Description	Source	EMFAC2007 Vehicle
1	LDA - DSL	LDA	Passenger Cars	EMFAC-LDV	LDA
2	LDA - GAS			EMFAC-LDV	
3	LDT1 - DSL	LDT1	Light-Duty Trucks (0-3750 lbs)	EMFAC-LDV	LDT1
4	LDT1 - GAS			EMFAC-LDV	
5	LDT2 - DSL	LDT2	Light-Duty Trucks (3751-5750 lbs)	EMFAC-LDV	LDT2
6	LDT2 - GAS			EMFAC-LDV	
7	LHD1 - DSL	LHD1	Light-Heavy-Duty Trucks (8501-10000 lbs)	EMFAC-LDV	LHDT1
8	LHD1 - GAS			EMFAC-LDV	
9	LHD2 - DSL	LHD2	Light-Heavy-Duty Trucks (10001-14000 lbs)	EMFAC-LDV	LHDT2
10	LHD2 - GAS			EMFAC-LDV	
11	MCY - GAS	MCY	Motorcycles	EMFAC-LDV	MCY
12	MDV - DSL	MDV	Medium-Duty Trucks (5751-8500 lbs)	EMFAC-LDV	MDV
13	MDV - GAS			EMFAC-LDV	
14	MH - DSL	MH	Motor Homes	EMFAC-LDV	MH
15	MH - GAS			EMFAC-LDV	
16	T6 Ag - DSL	T6 Ag	Medium-Heavy Duty Diesel Agriculture Truck	EMFAC-HD	MHDT
17	T6 CAIRP heavy - DSL	T6 CAIRP heavy	Medium-Heavy Duty Diesel CA International Registration Plan Truck with GVWR>26000 lbs	EMFAC-HD	
18	T6 CAIRP small - DSL	T6 CAIRP small	Medium-Heavy Duty Diesel CA International Registration Plan Truck with GVWR<=26000 lbs	EMFAC-HD	
19	T6 instate construction heavy - DSL	T6 instate construction heavy	Medium-Heavy Duty Diesel instate construction Truck with GVWR>26000 lbs	EMFAC-HD	
20	T6 instate construction small - DSL	T6 instate construction small	Medium-Heavy Duty Diesel instate construction Truck with GVWR<=26000 lbs	EMFAC-HD	
21	T6 instate heavy - DSL	T6 instate heavy	Medium-Heavy Duty Diesel instate Truck with GVWR>26000 lbs	EMFAC-HD	
22	T6 instate small - DSL	T6 instate small	Medium-Heavy Duty Diesel instate Truck with GVWR<=26000 lbs	EMFAC-HD	
23	T6 OOS heavy - DSL	T6 OOS heavy	Medium-Heavy Duty Diesel Out-of-state Truck with GVWR>26000 lbs	EMFAC-HD	
24	T6 OOS small - DSL	T6 OOS small	Medium-Heavy Duty Diesel Out-of-state Truck with GVWR<=26000 lbs	EMFAC-HD	
25	T6 Public - DSL	T6 Public	Medium-Heavy Duty Diesel Public Fleet Truck	EMFAC-HD	
26	T6 utility - DSL	T6 utility	Medium-Heavy Duty Diesel Utility Fleet Truck	EMFAC-HD	
27	T6TS - GAS	T6TS	Medium-Heavy Duty Gasoline Truck	EMFAC-LDV	
28	T7 Ag - DSL	T7 Ag	Heavy-Heavy Duty Diesel Agriculture Truck	EMFAC-HD	HHDT
29	T7 CAIRP - DSL	T7 CAIRP	Heavy-Heavy Duty Diesel CA International Registration Plan Truck	EMFAC-HD	
30	T7 CAIRP construction - DSL	T7 CAIRP construction	Heavy-Heavy Duty Diesel CA International Registration Plan Construction Truck	EMFAC-HD	
31	T7 NNOOS - DSL	T7 NNOOS	Heavy-Heavy Duty Diesel Non-Neighboring Out-of-state Truck	EMFAC-HD	
32	T7 NOOS - DSL	T7 NOOS	Heavy-Heavy Duty Diesel Neighboring Out-of-state Truck	EMFAC-HD	
33	T7 other port - DSL	T7 other port	Heavy-Heavy Duty Diesel Drayage Truck at Other Facilities	EMFAC-HD	
34	T7 POAK - DSL	T7 POAK	Heavy-Heavy Duty Diesel Drayage Truck in Bay Area	EMFAC-HD	
35	T7 POLA - DSL	T7 POLA	Heavy-Heavy Duty Diesel Drayage Truck near South Coast	EMFAC-HD	
36	T7 Public - DSL	T7 Public	Heavy-Heavy Duty Diesel Public Fleet Truck	EMFAC-HD	
37	T7 Single - DSL	T7 Single	Heavy-Heavy Duty Diesel Single Unit Truck	EMFAC-HD	
38	T7 single construction - DSL	T7 single construction	Heavy-Heavy Duty Diesel Single Unit Construction Truck	EMFAC-HD	
39	T7 SWCV - DSL	T7 SWCV	Heavy-Heavy Duty Diesel Solid Waste Collection Truck	EMFAC-HD	
40	T7 tractor - DSL	T7 tractor	Heavy-Heavy Duty Diesel Tractor Truck	EMFAC-HD	
41	T7 tractor construction - DSL	T7 tractor construction	Heavy-Heavy Duty Diesel Tractor Construction Truck	EMFAC-HD	
42	T7 utility - DSL	T7 utility	Heavy-Heavy Duty Diesel Utility Fleet Truck	EMFAC-HD	
43	T7IS - GAS	T7IS	Heavy-Heavy Duty Gasoline Truck	EMFAC-LDV	
44	PTO - DSL	PTO	Power Take Off	EMFAC-HD	
45	SBUS - DSL	SBUS	School Buses	EMFAC-HD	SBUS
46	SBUS - GAS		School Buses	EMFAC-LDV	
47	UBUS - DSL	UBUS	Urban Buses	EMFAC-LDV	UBUS
48	UBUS - GAS			EMFAC-LDV	
49	Motor Coach - DSL	Motor Coach	Motor Coach	EMFAC-HD	OBUS
50	OBUS - GAS	OBUS	Other Buses	EMFAC-LDV	
51	All Other Buses - DSL	All Other Buses	All Other Buses	EMFAC-HD	